

MODERN Machine Shop

February, 1942

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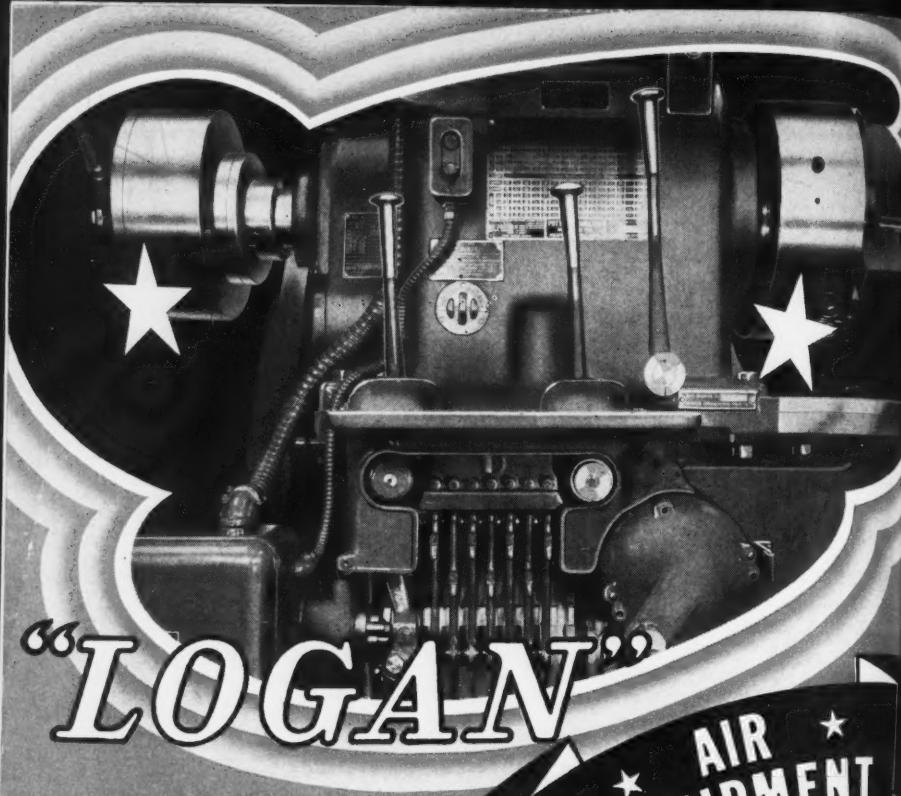
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MODERN Machine Shop

FEBRUARY, 1942
VOLUME 14 • NUMBER 9

Contents

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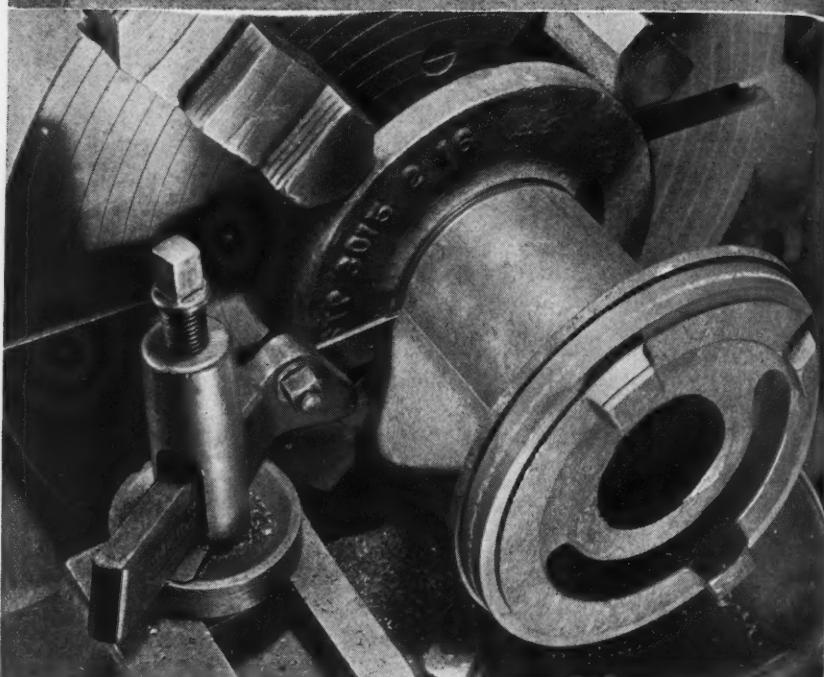
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Overnight the National Defense Program created a new industry of such tremendous proportions it is measured in multiples of the vast automobile industry, and with it, created great shortages of machines, factory space, skilled labor, raw materials . . . of almost everything used in industry.

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February,

MODERN Machine Shop

CINCINNATI, OHIO

FEBRUARY, 1942

VOL. 14, No. 9

We Present --

— as the opening article this month an exposition of the tools and methods involved in the machining of 81 mm trench mortar shells. None of the operations are particularly unusual, but it is interesting to see just what tools are used in the machining of these defense materials.

— on page 104—an unusually interesting discussion concerning the improvement in quality and production that can be brought about by the use of color in the machine shop. The information presented is taken from material that has been gathered by research engineers connected with one of America's greatest industries.

— on page 120—the fourth of Mr. Rundquist's series "Tooling the Automatic Screw Machine." In this article Mr. Rundquist discusses the uses and advantages of knee turning tools, roller rest turners, the various kinds of supports, and various types of cutting tools.

— on page 136—an article which should be of special value to the engineers and designers who are concerned with the application of electrically controlled methods and mechanisms to modern machine tools. It is interesting to note that the electrical devices now available have made it possible to simplify the mechanisms of machine tools considerably as compared with the number of parts that otherwise would be required.

— on page 158—the department "Modern Equipment at Work" in which will be found descriptions and illustrations of several interesting applications of modern metal manufacturing equipment.

— the usual assortment of interesting "Ideas from Readers," "Tools for National Defense," "New Shop Equipment" items and Wesser's monthly cartoon.



Manufacturing Operations on the 81 mm Trench Mortar Shell

This article is a presentation of the methods used in the manufacture of trench mortar shells at the Ewart Works of the Link-Belt Company, at Indianapolis, Indiana

By HOWARD CAMPBELL
Editor, MODERN MACHINE SHOP

DEVELOPED to its present high point of efficiency since the previous "World War," the trench mortar is an extremely effective piece of equipment for engagement at close range. The shells are light, weighing

approximately five pounds when loaded, and are intended upon firing to describe a high trajectory so as to fall behind the defense of the opposing forces.

The operations involved in the production of the 81 mm. trench mortar shell are not particularly unusual, but they are interesting because the product itself is of special interest at

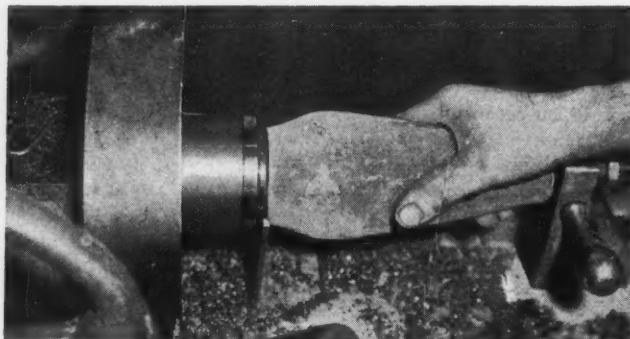


Fig. 1—Boring Nose of 81 MM Trench Mortar Shell

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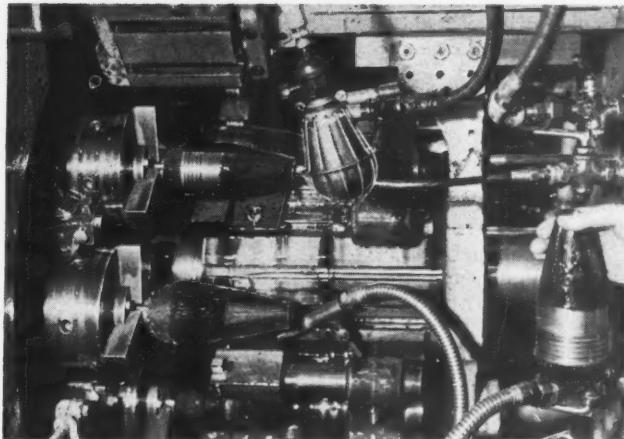
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Fig. 2—This Operation, Performed in a National Acme Automatic, Consists of Turning the O. D., Turning and Grooving the Bourrelet, Finish Facing the Tail End, and Drilling the Tail End



the moment.

The shell body is upset forged from SAE 1335 steel. In the first operation, shown in process in Fig. 1, the nose end is bored to provide a locating point from which to work on subsequent operations. To hold the piece for boring, the shell is gripped by an internal expanding chuck and held stationary while the boring tool is fed into the nose by means of a hand-wheel feed. To keep the chuck properly expanded and maintain the workpiece in position while the boring operation is in process a hinged block to which a handle is attached, visible in Fig. 1, is dropped into position at the rear end of the shell, as shown. Using a single-point tool, the nose end of the shell is bored to a diameter of 1.850 inch.

The internal chuck is of toggle-joint design and can be expanded by hand.

The alignment of the chuck with the boring head is maintained by a pilot which is a running fit in the hole in the machine spindle.

In the next operation, which is performed in the National Acme six-spindle automatic machine shown in Fig. 2, the following operations are performed: First spindle, load; second spindle, turn one-half of O. D. and drill and ream the tail end; third spindle, complete turning operation

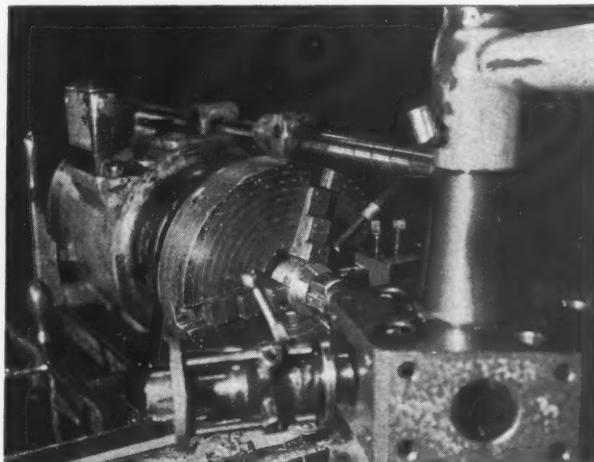


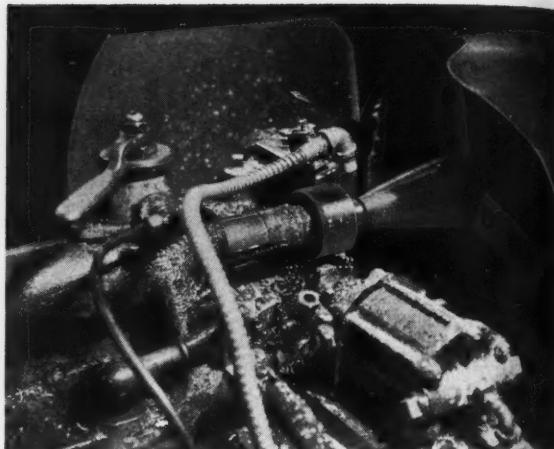
Fig. 3—In This Operation the Nose is Bored and Tapped for the Fuze Adapter

Fig. 4—Turning the Tailstock on the Shell. An Air-Operated Tailstock Aids This Operation

on O. D.; fourth spindle, turn bourrelet; fifth spindle, groove bourrelet; sixth spindle, finish bourrelet. One of the finished pieces can be seen in a vertical position at the right in the illustration.

The "bourrelet" is a section through the largest part of the shell which is grooved somewhat in the manner of a piston to prevent the escape of the explosive gases when the shell cartridge is fired. Inasmuch as the trench mortar shell is intended to travel a maximum distance of 3,200 yards, a small charge is used and the shell is a loose fit in the bore of the mortar barrel.

In the next operation the shell is chucked in a Potter & Johnson automatic, as shown in Fig. 3, where a



finish boring operation is performed in the nose of the piece, then the nose is tapped with a 2-inch 12-P. collapsible tap, and the O. D. of the nose is finish turned with a form tool. The boring tool is shown in process, with the form tool, held in the rear carriage tool holder, ready to move in. Two machines are used on this operation, one operator handling both machines.

The shell is now chucked in a Coulter Automatic Lathe, shown in Fig.

4, where the O. D. of the body is turned from the tail to the bourrelet. A single point tool is used for this operation, the necessary taper on the contour being achieved by the use of a taper attachment.

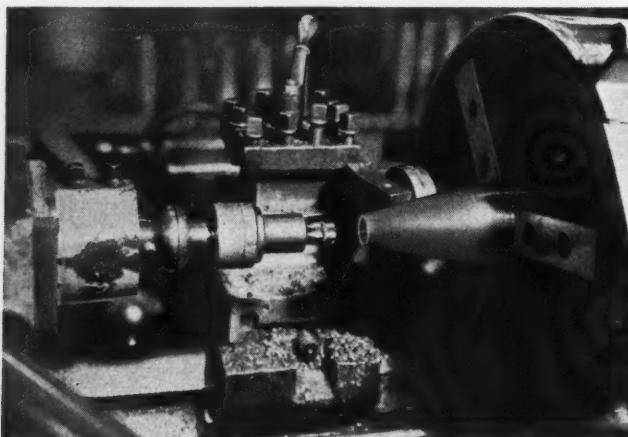


Fig. 5—The Tail End is Tapped to Receive the Threaded Stud on the Tail Assembly



Fig. 6—The Machining Operations Completed, the Shell is Weighed To Make Sure that it is Within the Required Limits of Weight

The completed shell carries a "tail" made from sheet metal stampings assembled together so as to present six "fins" which guide the shell in its flight so that it will land on its nose when it strikes and will thus be exploded. The tail also carries the cartridge, which is inserted into the cylindrical receptacle formed when the tail stampings are assembled together. In action, the shell is dropped tail-end down into the muzzle of a trench mortar. As the shell strikes the bottom of the barrel the percussion cap in the cartridge strikes a firing pin, which explodes it and thus sends the shell on its way.

To provide for assembling the tail to the shell, the tail carries a threaded stud, the thread of which corresponds to a similar thread in the tail end of the shell. To thread the hole in the tail end of the shell, the shell is chucked in the Warner & Swasey Turret Lathe shown in Fig. 5, where it is tapped with an 0.800

The maximum of speed is obtained on this operation through the use of an air chuck which is connected to the tailstock center in such manner that the center can be moved to or from the work instantly.

In the same operation, Fig. 4, the shell is stamped with a rotary stamp which, held in the carriage tool turret, is forced into the periphery of the shell as the shell is slowly revolved. This data includes the lot number of the shell, year in which it was manufactured, initials or symbol of the manufacturer, caliber, and designation of the shell.



Fig. 7—The Shell is Held in This Air-Operated Chuck while the Adapter is Assembled in Place

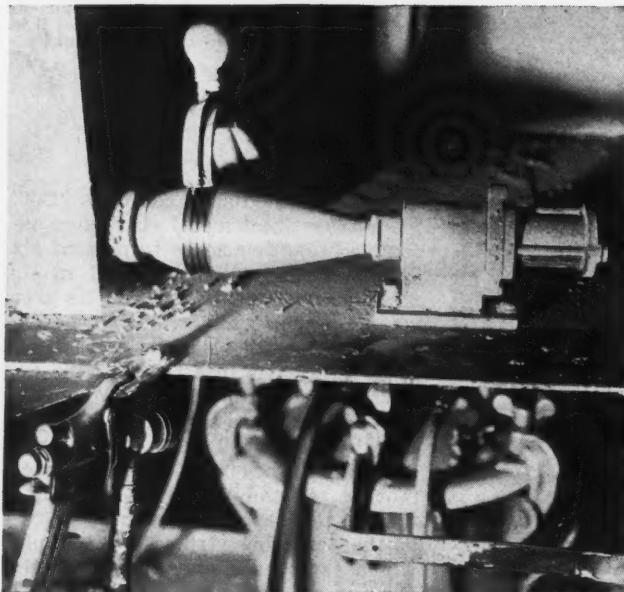


Fig. 8 — With the Bourrelet Covered with a Guard, Each Shell is Sprayed with Lacquer on the Outside and Acid-Proof Paint on the Inside

inch 16-P. tap held in the lathe turret.

At this point in the manufacturing routine the shell is weighed to make sure that it is within the required limits of weight. Maximum and minimum limits of weight are necessary in order that accuracy in firing may be obtained with a uniform cartridge load. The shell must weigh 3.94 pounds, within limits of plus or minus 0.13 pound. The shell is shown in position for weighing in Fig. 6. Ma-

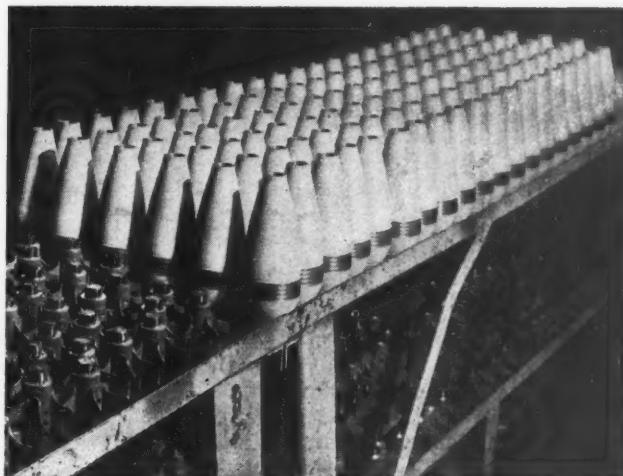
cheded between the jaws of a two-jaw air-operated chuck, shown in Fig. 7, while the adapter is threaded into the nose with a special wrench.

The next operation on the shell is that of spraying inside and out—inside with an acid-proof black paint which serves as a protective coating, and outside with a yellow lacquer which not only affords protection against rust but also indicates that the shell is not yet loaded. After the shell has been loaded, it is sprayed

We, the people of the United States, are at war. Our soldiers and sailors are fighting the enemy on the land, on the sea, and in the air in order that we may continue to live under our own flag and under our own government in liberty and freedom. The least we can do is to make sure that they are provided with all the planes, tanks, bombs, shells, and ammunition they need to win. This we can do by lending our money to our government now. Each lender will receive a Government promissory note—a Defense Bond—which guarantees the return of the money at the end of ten years with 33½ per cent accumulated interest.

With the
Covered
Card, Each
Is Coated
in the Oil-
Acid-Proof
the Inside

Fig. 9 — Finished
Shells and "Tails"
Ready for Assembling



with red lacquer.

To spray the shell, it is gripped between a revolving chuck at the front end and an air-operated center at the tail end, as shown in Fig. 8. A hinged guard is swung down to cover the bourrelet to keep it free of lacquer. As the shell revolves with the chuck a DeVilbiss spray gun is brought into play and the shell is covered with a yellow coating. Upon completion, the guard is swung clear of the shell, the revolving spindle is stopped, the oper-

ator grips the shell at the bourrelet, and the shell is removed from the machine. Upon drying, the shell is ready to receive the "tail," and the shell then needs only to be loaded with the cartridge and powder to be ready for action.

U. S. Trade with Latin America

Trade between the United States and Latin America during the first nine months of 1941 was a third larger than in the corresponding period of 1940, and about 75 per cent greater than in the same months of 1939.

Recognizing the importance of the other American Republics to this nation—and of this nation to the other Republics—our government has taken a number of steps to assist Latin American governments in increasing their flow of commodities, especially critical war materials, to the United States.

The Priorities Division, for example, granted high priority ratings to aid construction of a Brazilian steel mill. Machinery and equipment has been made available by means of Priority assis-

tance to help increase the output of Chilean copper mines.

United States imports from Latin America have been growing even faster than total trade. For the first time in recent history, U. S. imports from Latin America have been larger than exports to the same countries. In pre-war terms this would have been called an "unfavorable balance of trade," but since the Japanese attack on Pearl Harbor it is a gratifying sign of the strength and unity of the Western Hemisphere in materials and productive capacity.

Lima Gear Shift Motors and Selective Speed Drives are illustrated and described in a six-page bulletin now being issued by The Lima Electric Motor Co., Lima, Ohio. Copy free upon request.

"Three-Dimensional Seeing"

By ALLAN PERRY

TWELVE years ago a New England shoe manufacturer was hearing complaints from his machine operators. They had headaches. Now and then spots would dance before their eyes. He seated himself on the sidelines to watch his operators at work.

He studied a man finishing a black shoe on a black machine. Noticing that the shoe and the machine blended into one dark mass, the manufacturer acted on a sudden impulse and told the operator to go to the paint shop, select a pleasant color, and then clean and paint his machine anew. It wasn't long before the other workers in the plant followed suit. The shop glittered with every gaudy color in the rainbow. And it is said that accidents fell off nearly 70 per cent. Operators claimed they felt far less fatigued. Fewer "seconds" came through, output increased.

Other rule-of-thumb experiments based on this simple, common-sense idea were tried by factory operators, but it was inevitable that sooner or

later scientific research would come to decisive grips with lighting and "seeing" conditions in shops, where, despite this highly mechanized age of mass production, results still depend

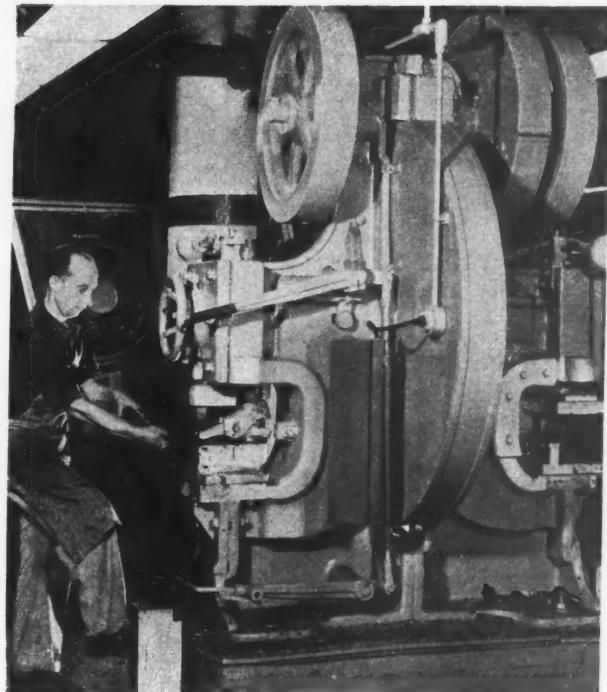
largely upon the speed and accuracy of the men who run the machines, and whose nimble fingers are no better than the eyes that guide them.

With national production aiming today at constantly higher peaks an announcement made at the annual convention of the Illuminating Engineering Society at Atlanta, Georgia, September 22-25, was particularly timely. Arthur A. Brainard, director of the Lighting Service Section of the Philadelphia Electric Company, in collaboration with E. I. du Pont de Nemours & Company, Inc., revealed the results of a two years field investigation into the problem of "Improved Vision in Machine Tool Operations by Color Contrast."

His paper dealt with the new endeavor. Aptly, Du Pont color technicians named it "Three-Dimensional Seeing."

In this article the author presents some of the facts that have been uncovered by research engineers in the field of improved vision for machine tool operation.

in its original dark gray, this punch press, selected as a "guinea pig" by du Pont paint technicians, was so near the color of the metal undergoing fabrication that it was difficult for the operator's eyes to separate the danger point from other machine areas.



Using the Yankee shoe manufacturer's idea of a dozen years ago as a starter, Brainerd showed that research had dug exhaustively into the problem of providing natural seeing conditions indoors, and had uncovered facts meriting the attention of every industrial producer. The collaborators assert that Three-Dimensional Seeing contributes to:

1. Increased production.
2. Reduced accident hazards.
3. More comfortable working conditions.
4. Improved labor relations.

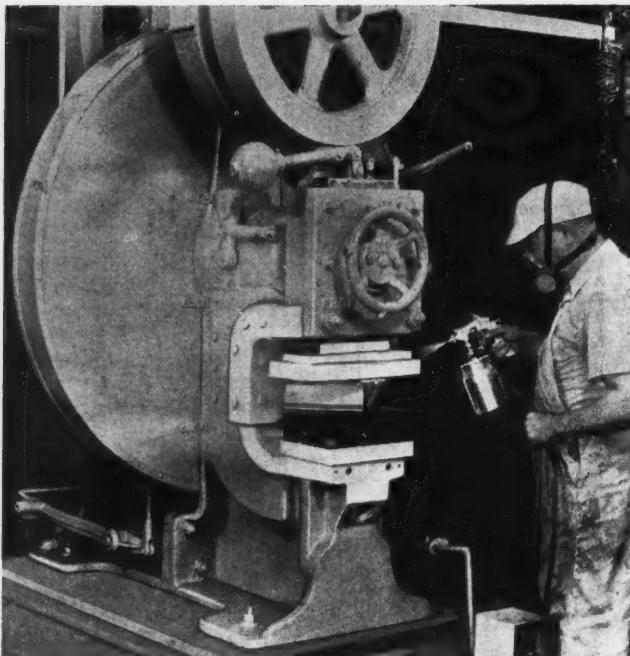
What then, precisely, is Three-Dimensional Seeing? In answering the question, it will be wise to present the investigators' line of reasoning from the beginning and follow along the path of their research, as outlined at the Atlanta meeting of illuminating engineers.

Machines are most frequently painted bottle green, deep gray, or black, and thus afford almost no color or brightness contrast to the material under fabrication. The average factory walls and ceilings seldom reflect as much light as they should. Dingy

walls, ceilings, and dark-painted machinery "soak up" both sun and artificial light. In such surroundings, "piling on" lighting does not produce the expected improvement in seeing. It is an example of camouflage.

Improved vision is not entirely a question of brightening up reflecting surfaces. Contrasts in color are also important, and the least understood phase of the problem.

"Consider the outside world of Nature," scientists say in pointing out the value of color contrast in furthering strainless, full vision. Nature provides a blue sky, white fleecy clouds, an orange-red sun, green grass, gay flowers and brown earth. Everywhere, varieties of hue and brightness lessen the load on the eyes.



After painting this punch press to remove the camouflage caused by solid, dull colors, the working area was "spotlighted." This technique reduced eye fatigue and increased operating efficiency because the work in production stood out in stereoscopic sharpness.

Following Nature's lead, much has been done to improve visibility in offices and homes by means of correct brightness and color contrasts. But in machine shops comparatively little attention has been given to scientific lighting efficiency, and even less to the color of machines.

For example, bandsaws are old enemies of safety. Usually they are so "camouflaged" with dull gray paint that danger points are difficult to distinguish. The same is generally true with millers and lathes. Yet the fact is that it is no more sensible to obscure the working areas of machines—potentially dangerous or not—by an overall coat of traditional dark gray paint than it would be to finish the keys of a piano in the same color as the mahogany or walnut piano case. In demonstrating how "danger points" of working machinery can be

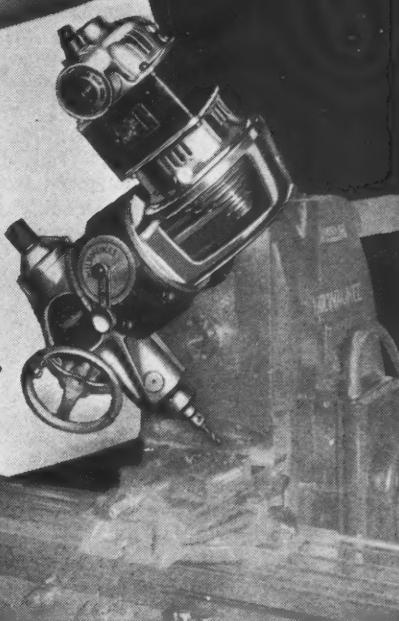
emphasized through the scientific use of colors, it is not intended that color be substituted for adequate guarding, but rather that it be used to indicate hazardous locations. Mechanical guarding and personal protec-

tive equipment should, of course, be provided according to insurance regulations and individual state requirements.

In order to duplicate average conditions, two machine tools in a typical repair machine shop doing a wide variety of work were selected for the Du Pont-Philadelphia Electric color and light tests. Since colors vary under different types of light, both incandescent and mercury-lighting equipment were installed for the machines under observation. The original battleship gray of the machines which is very low in ability to reflect light, was painted over with colors having good light reflecting characteristics. Each machine was completely repainted with one of these semi-gloss, oil-resistant, washable machinery paints every second Friday.

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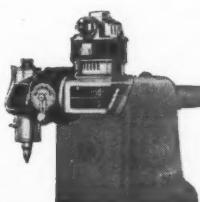
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Over a period of several months these colors were tried out: aluminum, light gray, light green, yellow, light blue, light buff.

Photometric readings were recorded of the light falling on the working surfaces of the machines, and of the light reflected from them. To determine the psychological effect of the various colors upon the workers, a simple questionnaire was put before a group of 15 men, including two foremen.

They were asked the following six questions after each color had been in use:

1. Is the new paint color more or less tiring than original?
2. Can you see better than with original?
3. Can you work faster than with original?
4. Is it easier to do better work than with original?
5. Do you need more light?
6. Do you think it's safer than before?

The results of the questionnaire and the reflection brightness measurements were correlated with the timed operating efficiency of the workers performing standard tasks at their machines.

What colors had the highest rating?

Light buff and light gray.

This excursion into the unexplored field of improved vision by color contrast was, at this point, essentially theoretical. The maintenance department was yet to be consulted. The idea of painting machines light buff might be impractical, and that is just what the maintenance men promptly said it was.

As a compromise, accordingly, all machines were painted a medium gray with light buff around the working area. The purpose was to utilize the light reflecting ability of the light buff finish and still satisfy main-

nance requirements. Surprisingly, the combination performed better than any of the solid colors.

This two color system, the collaborating companies reported, has been in use since September, 1939. Mechanics are so pleased with its benefits that they tend to keep the light buff areas—where work and accident hazard is "spotlighted"—clean.

Advanced field investigations are currently being conducted in several industrial concerns, and it is expected that more complete data will be available in the near future. However, results to date are sufficiently conclusive to warrant management giving serious thought to adopting the "Three-Dimensional Seeing" idea. Inasmuch as they indicate it is a production-accelerator, an accident-reducer, and a morale-builder in tests confined thus far to machine tools, there is every reason to have confidence in the value of its adaptability for factory machinery in general.

So enthusiastic, in fact, are the technicians in Du Pont's Finishes Division that they have named the winning paint colors of Three-Dimensional Seeing "spotlight buff" and "horizon gray." Moreover, they are offering gratis a technical service in the field, and have made a color motion picture of this new method of harnessing brightness and color contrast for better vision for the men operating our industrial machines.

Industrial America has plenty of work laid out to insure our national defense, and every one is agreed that in carrying through this job, the Shakespearean line, "If it were done . . . then 'twere well it were done quickly," is much to the point. But that involves more than merely accelerating the r.p.m.'s of the machines in our plants and factories. Rapid production depends as well upon human factors and upon the ability of men and women employees

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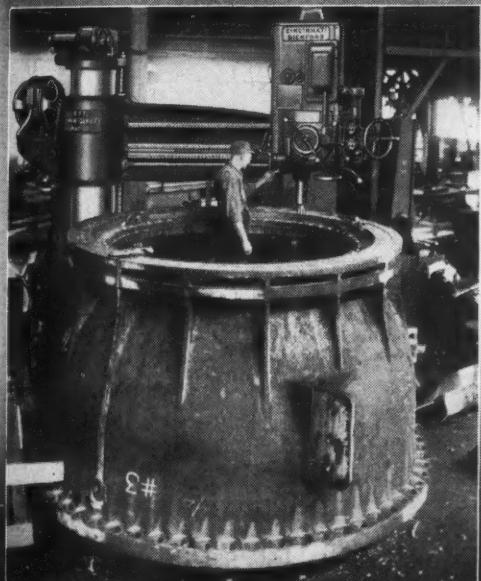
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Send for Bulletin R-24 covering these machines.

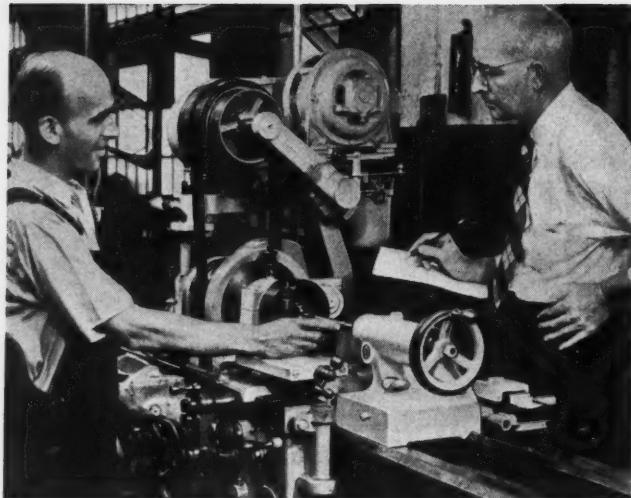


60-ton Valve being drilled, tapped and spot-faced on a Super Service Radial at The Thomas Spacing Machine Company, Pittsburgh, Pa.



THE CINCINNATI BICKFORD TOOL CO.

OAKLEY • CINCINNATI • OHIO • U. S. A.



Time studies and psychological surveys showed that Spot light Buff at work areas and Hormel Gray on the bodies of the machines increased operating efficiency and the workers reacted more favorably to this pleasing combination than to other colors.

to do their work safely and skillfully—and for that, better factory lighting is needed.

While human eyes can adapt themselves to widely differing conditions, the strain of working at a job that calls for good vision in a poorly-illuminated room is too great to be endured long without fatigue that lowers the operator's efficiency and productiveness. Employees cannot work well if they cannot see objects clearly—and that applies particularly to tasks involving great precision.

The results of the Du Pont-Philadelphia Electric research program that brought "Three - Dimensional Seeing" into being proves the value of the scientific use of paint on machine tools, and the likelihood of its eventual adoption throughout industry following further studies. But it must be remembered, lighting and color technicians warn, that providing scientific lighting of maximum efficiency is an individual problem with each case, and a job for the professionally-trained and experienced engineer.

The technology is too involved for

discussion here. Laymen are not interested in visibility readings, foot-candle measurements, nor in light - reflection

and transmission factors, but engineers need this information in their professional work, and they are getting more and more of it from our nation's physical and chemical laboratories and from their own cooperative research studies.

As an instance in point, the Lamp Division of Westinghouse Electric & Manufacturing Company, Inc. has compiled data showing the reflection factors, in percentage figures, of Du Pont white and light-colored paints and finishes. The reflection factor, it may be explained, is determined by comparison with magnesium carbonate, which has a rating of 98 per cent and is the accepted standard.

"Du-Lite" Mill White	92%
Eggshell	83%
"Du-Lite" Mill White	86%
Gloss	78%
"Dulux" Mill White Gloss	85%
"Dulux" Mill White	83%
Eggshell	83%
Interior Gloss White	86%
Interior Gloss Light Ivory	78%
Interior Gloss Light Buff	62%
Interior Semi-Gloss White	82%
Interior Semi-Gloss Ivory	78%

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February, 190

ARMOR PLATE

... is being straightened on this husky Cincinnati Press Brake. Tank armor plate is warped by heat treatment and must be straightened. The efficient and accepted method is to strike these tough steel slabs repeatedly between dies mounted in a large press brake.

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SHAPERS • SHEARS • BRAKES
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One requirement of all lighting systems is that there should not be excessive contrasts of illuminating within the worker's field of vision. Glaring lamps that cast sharp shadows are to be avoided. It is important not only to provide enough light, but also to secure the right degree of light diffusion for maximum efficiency. Any competent illuminating engineer, after studying the particular requirements of a room, will know how best to achieve the result desired.

The system most commonly installed in industrial plants is direct lighting, although in most cases the intensity of direct light is modified by shielding devices and by applying to the wall and ceiling surfaces suitable light-reflecting or light-diffusing paints. As a general rule, ceilings should reflect at least 75 per cent of the light that strikes them, and even higher values are desirable. Painted

walls directly in line with a worker's vision should have a light-reflection factor of 50 to 60 per cent. Paint helps in conserving light for use, and also diffuses it, thus eliminating the sharp contrasts which are so objectionable.

Other lighting systems mentioned also depend upon secondary reflecting surfaces to a greater or lesser extent. Indirect or semi-indirect lighting systems are particularly dependent upon paint for their maximum effectiveness. Freshly-painted white ceilings and walls reflect a maximum of light, but sometimes, even at a sacrifice of lighting efficiency, it may be preferable to use light colors other than white to produce a desired decorative effect. Conditions are encountered where a high gloss finish, reflecting light at sharp angles, would be objectionable because of the tendency to produce glare. In such cases, it is better to apply paint in a flat or egg-

Mechanical Filing With Hand Files

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Reduce costs and improve quality with this TRIPLE-PURPOSE Machine

A versatile bench type machine for all three major production steps in the die-making process—sawing, filing and stoning. Quality built throughout to stand up longer and produce more accurate work. Forced-feed lubrication plus hardened and ground shafts running in bronze bushings combine to minimize wear and prolong life. Maintained accuracy is secured through holding chuck and clamping device which provide positive file alignment, and balanced moving parts which operate without vibration. Write for descriptive literature.

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There is only one word now in the Dictionary— **VICTORY**

For years we have published a page each January, called the New Industrial Dictionary, because "old words have new meanings in these changing times" . . . We gave what seemed to us the modern significance of such words as labor, taxes, profit, management.

This year there is only one word with any significance—Victory. If you and we don't keep that word in the dictionary, we can tear up the book. Words and phrases such as social gains, conservatism, profit system, and liberty won't mean a thing.

The time has come—now—when every man and woman—workman, manager, politician, labor leader—is *all for America* or *all against America*. There can be no hyphenated loyalty to America and some private cause. This country is all the cause any of us needs or can afford.

To try to save America and some self-interest privilege is the surest way to lose both. To *work for America* is the only way to save everything America stands for.

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shell finish for greater light diffusion.

One exception is in factories with high ceilings, where little direct light, either natural or artificial, strikes the ceiling or upper wall surfaces. A flat finish in such rooms is of no practical advantage, and a gloss white can be recommended. In practice, local plant conditions always determine whether a gloss or flat finish should be specified. The lower wall areas, below the eye level of a seated person, do not reflect useful light to the working plane and may therefore be—and usually are—painted in a darker color.

These painting recommendations apply as well to fluorescent or mercury vapor light as they do to incandescent lamps. There are, however, differences in color of the light provided. Just as a color, observed in daylight, looks different under incandescent lamps, so also does the same color appear in fluorescent or mer-

cury vapor light. Incandescent lamps have a warmth and reddish-yellow glow to which we are accustomed, whereas the newer phosphorescent light has a coldness and bluish-gray cast which—probably because we are not yet accustomed to it—may be considered “unnatural.”

When fluorescent lamps are used colors for interior decoration should be chosen only after they have been examined under the type of lighting that will be used. There are three types of fluorescent white light that cause color to change as noted below.

Daylight

This produces a slightly blue light that makes colors look colder and grayer. It makes yellows appear greenish, gives pinks a lavender cast, turns greens into blue greens, accentuates the blueness of blues and makes white look light blue.

“Accurate Engraving With Unskilled Operators Engrave Iron, Soft Steel, Copper, Brass Aluminum, Plastics on the Auto-Engraver

Flat or Round Surfaces



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Letters are engraved from master type (block and script letters) furnished with machine. Also designs, emblems, signatures, etc. can easily be traced from original drawings. Engraves on flat or round surfaces. Vise capacity 4 1/2" x 15". Set-up quickly changed. After 30 minutes practice a novice can engrave perfectly.

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and in addition saves
refitting time

Haynes Stellite hard-facing alloy increases the life of hot-work dies because it resists abrasive wear at high temperatures. In addition, maintenance costs are reduced—not only because dies have to be changed less frequently, but because you can refit a hard-faced die in less time than is required for refitting a plain steel die. Shown at the right are 8 dies—used in the plant of a motor manufacturer—which were hard-faced with Haynes Stellite No. 6 alloy. These dies have lasted ordinary steel dies from 3 to 10 times, and are refitted in approximately half the time.

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Haynes Stellite alloy is being used satisfactorily on wearing parts in practically every industry. Haynes Stellite engineers and Linde service operators will be glad to give you practical assistance and to show you how hard-facing makes possible higher production... with lower costs and fewer shutdowns. Write or phone the distributor nearest you.

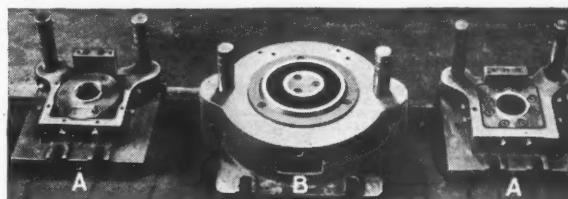
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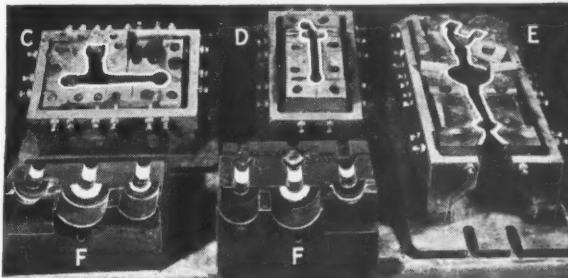


Red-hard, wear-resisting alloy of cobalt, chromium, and tungsten.

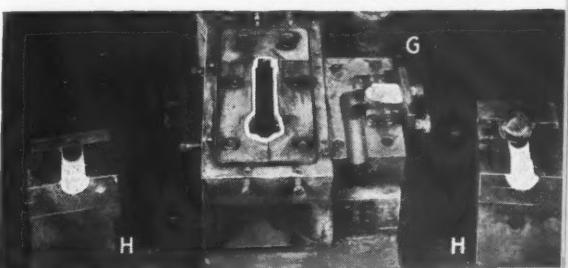
"Haynes Stellite" is a registered trade-mark of Haynes Stellite Company.



	No. of Pieces Run	Hours to Refit
A—Hot-Trimming Die for Rear Axle Differential Gear	Steel—4,000 Hard-Faced—20,000	Steel—16 Hard-Faced—6
B—Hot-Trimming and Piercing Die for Ring Gear	Steel—2,500 Hard-Faced—15,000	Steel—20 Hard-Faced—12



	No. of Pieces Run	Hours to Refit
C—Hot-Trimming Die for Wheel Support	Steel—2,500 Hard-Faced—7,500	Steel—16 Hard-Faced—8
D—Hot-Trimming Die for Steering Crank	Steel—1,750 Hard-Faced—7,500	Steel—16 Hard-Faced—8
E—Hot-Trimming Die for Front Wheel Support Arm	Steel—2,500 Hard-Faced—7,500	Steel—40 Hard-Faced—20
F—Upsetting Die for Pinion Gear	Steel—5,000 Hard-Faced—25,000	Steel—120 Hard-Faced—70



	No. of Pieces Run	Hours to Refit
G—Hot-Trimming Die for Steering Cross Shaft	Steel—3,500 Hard-Faced—15,000	Steel—28 Hard-Faced—10
H—Upsetting Die for Pinion Gear	Steel—5,000 Hard-Faced—25,000	Steel—120 Hard-Faced—70



TRUE Thoroughbreds, made of the finest quality bortz and resinoid bond, for sharpening cemented carbide tools faster, to a flatter surface and higher finish, more economically, SECOMET RESINOID BONDED DIAMOND WHEELS are available in a wide range of standardized sizes and types to enable you to select a suitable wheel to meet any ordinary requirements, for extraordinary results.

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3500 Degree White

This produces a yellow green light. It has the effect of graying most colors. It increases the greenness of all green tints and makes yellows, buff and ivory look a bit green and causes most other colors to look grayer.

Soft White

This produces a slightly lavender light. It creates the warmest appearance of any fluorescent lamps. It emphasizes the blues and reds at the expense of yellows and greens.

The machine shop of tomorrow, it is a safe prediction, will not be a dark and dingy place where camouflage plays havoc with workers' eyes and hands, where skill and precision are forced constantly to fight handicaps. Instead, the future shop will be bright and clean, almost colorful. The eyes that guide valuable nimble fingers will be given a clear, sharp stereoscopic view—Three Dimensional Seeing—color and light in scientific combination.

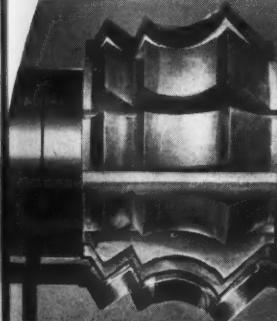
"Safety Always" is the title of a 24-page booklet prepared by the Allis-Chalmers Mfg. Co., Milwaukee, Wis. Based on safety tips uncovered in a long-term survey of industrial accidents, the booklet is offered to shop employees as a safety guide. Special instructions for the care of eyes, hands, and feet are listed and illustrated. The wide use of standard safety goggles and steel-toe safety shoes is advocated.

"Die Springs" is the title of an 8½ x 11-inch, four-color bulletin prepared by the Muehlhausen Spring Corp., Logansport, Ind., containing illustrations, descriptions, and prices on die springs for high speed presses, regular speed presses, and heavy duty presses. Printed on heavy card stock for the convenient filing, all die spring information is presented in a condensed tabular style easy to understand. Copy of bulletin free upon request.

ONE PIECE Every 90 Seconds



WITH B-C UNGROUND FORMED CUTTER



Calculating machines require odd-shaped parts. One of the principal profiling cuts on this rotor disc is accomplished on the set-up shown in the photograph.

SAVE MONEY!



PRODUCTION DATA

Name of Part — Rotor Disc

Material — Soft Brass

Thickness of Piece — .2362"

Feed — 5" per minute

Cutter Speed — 400 r.p.m.

Machine — Brown & Sharpe No. 0

Holding Means — Clamped in Special Fixture in Screw Vise; Piece located by Center Keyed Hole.

Production — 40 pieces per hour.

Pieces per Cutter Grind — 1200.

Barber-Colman UNGROUND Formed Relieved Milling Cutters are, naturally, lower in cost than the ground type, yet they have an inherent accuracy which is adequate for a great many profiling and form-cutting operations. For instance, on the example shown, the form is held to an accuracy of less than .001". For freer and faster cutting, we recommend these cutters with spiral gashes, and we can provide cutters of this type with accuracy comparable to those with straight gashes. (The cutter shown here has straight gashes.) Barber-Colman Formed Cutters made a name for themselves in World War I on small arms production and the added experience gained on thousands of jobs in the intervening quarter-century is your guarantee of satisfaction.

LET US QUOTE ON YOUR NEEDS

Formed Cutters are generally designed individually for each specific job. If you will furnish full details of the work to be done, we can give you an accurate proposal on cost and results.



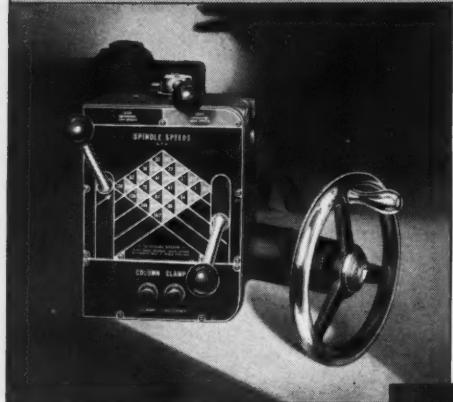
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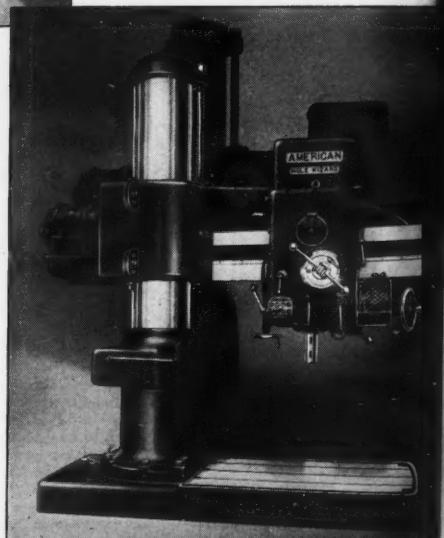
OPERATORS USE **CORRECT** SPEEDS and FEEDS WHEN "AMERICAN HOLE WIZARDS ARE ON THE JOB!"



"American" Hole Wizards are "opening the eyes" of production men in the finest shops all over the country. On drilling, tapping, boring and facing operations they are hanging up new records for quantity and quality. They are recognized as the PACE-SETTERS in the best equipped drilling departments.

This newest new Radial reveals all of its secrets in Bulletin No. 325.

Securing the correct operating speeds and feeds "American" Hole Wizards is so fast, simple and positive that operators do not object to making speed and feed changes to get the right combination for the work being done. This results in more work per hour, longer tool life and a fat pay envelope for the operator.



THE AMERICAN TOOL WORKS COMPANY

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MORE VERSATILE **MACHINES for MORE** **PROFITABLE WORK**



Heavy Duty grinding is only one of **many** jobs Haskins Flexible Shaft Equipment will do for you at less cost per man and machine hour. Haskins makes 30 different kinds of equipment—but **each** kind will do **many** kinds of work. See how you can apply flexible shaft equipment to more jobs—more profitably. Send for Catalog 45. You'll find it full of valuable information covering grinding, sanding, wire brushing, polishing and rotary filing operations. R. G. Haskins Company, 619 S. California Ave., Chicago, Ill.

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Tooling the Automatic Screw Machine, IV

Knee Turning Tools — Roller Rest Turners — Supports — Boring Bars — Drilling Methods — Reaming and Counterboring — Hollow Milling

By B. C. RUNDQUIST
The National Acme Company, Cleveland, Ohio

THE end tool slide, as the name implies, carries tools for all positions that work from the end on the bar or piece to be made. A multiple spindle automatic machine without an end tool slide would lose the flexibility necessary to perform a wide variety of operations simultaneously and the advantage of the proper tools to do a job in the shortest possible time.

Not only does the end tool slide carry all drills, reamers, turning tools, and other tools, but when there

are not enough cross slide positions available so that the operations can be divided and thus shorten the time required for the longest cut, substitute tools (for removing stock, facing, and chamfering corners) can be used on the end tool slide. Also, the end tool slide carries many of the special attachments for such operations as internal recessing, taper turning, accelerated reaming, threading, and so on. Hence the end tool slide is one of the units necessary to make a multiple spindle bar machine "fully automatic."

The movement of the end tool slide is controlled by the tool slide cams on the tool slide drum, therefore all tools carried on it must have the same feed except when an attachment is used for drilling, reaming, or turning with some other means of acceleration. But most of the time the tools used to cut from the end of the bar are single

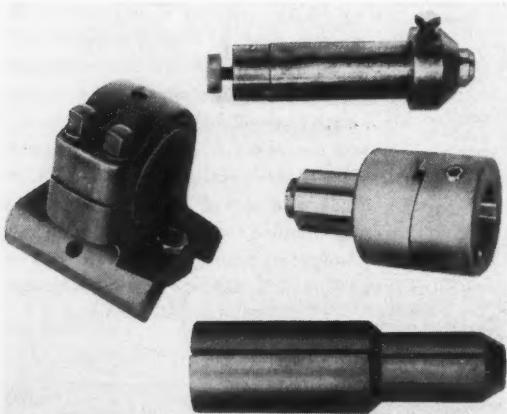


Fig. 1—Toolholders and Bushing for End Tool Slide

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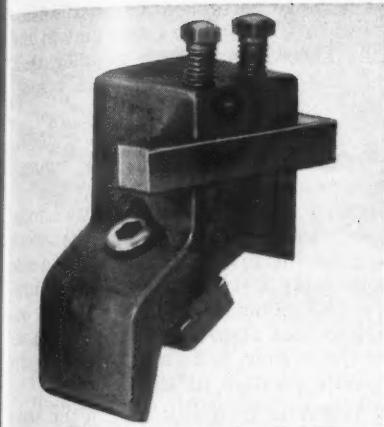


Fig. 2—Knee Turner

point cutting tools, with which the same feeds usually can be used. Positioning the tools forward or back on the slide for successive cuts makes it possible to divide the operations and thus the time.

In plannings tools for use on the toolslide, care should be taken to design them so that they will always clear each other as well as the tools on the cross slide in the same spindle position, when all have reached the limit of their forward movement.

Multiple spindle automatic bar machines are furnished with heavy, rigid toolholders, made to clamp onto the tool slide at each position. These holders are fitted and marked for the individual positions, and are bored from the spindle to secure perfect alignment with all work spindles. Bushings to carry drills, reamers, counterbores, boring bars, and other tools are clamped and held in these holders. Thus in tooling up a machine it is only necessary to make the tools and bushings. These standard holders generally carry the spindles of special attachments.

Drills over $\frac{3}{8}$ inch diameter are held in split bushings. For the

smaller drill it is better to use a standard commercial drill chuck, for which it is only necessary to make a bushing. Reamers are held in floating holders which can be made or purchased as desired. Counterbores, boring bars, and similar tools necessitate the use of split bushings.

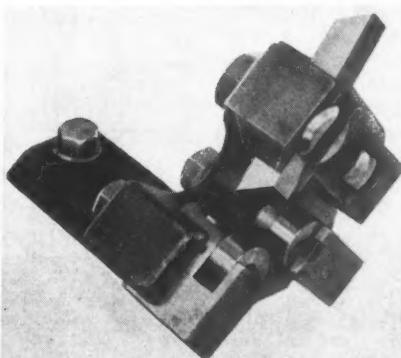
Knee Turning Tools

Knee "turners" are used in all spindle positions to remove stock in roughing, to face end and shoulders, and to chamfer either the outside edges or the edges of drilled or reamed holes. The turner is simply a toolbit held in a bracket to be clamped on the tool slide in a convenient position where clearance for other tools is provided. It can be made for either right or left hand, and the toolbit can be located in the holder either straight or at an angle.

Roller Rest Turners

The roller rest turner is made to use in any spindle position for removing stock that cannot be removed with a knee turner. It is also used where close tolerances are necessary. A frame, made to clamp onto the T-slots of the tool slide, carries a toolbit and two rollers which are positioned to support the work against

Fig. 3—Roller Rest Turner



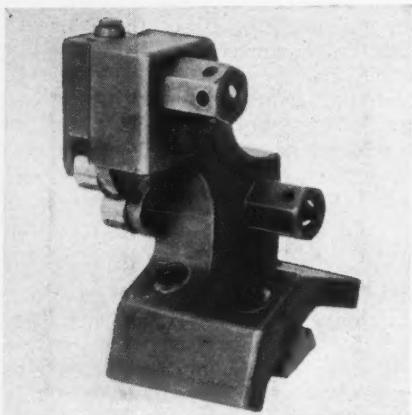


Fig. 4—Roller Rest

the thrust of the tool. The cutting tool is placed in the same position as a forming tool on the cross slide of the same spindle position so that the supporting rolls will be in the right location to take the thrust of a forming tool when used. By this means, diameters can be held concentric to any forming that might be done at the same time.

By having both the tool and rolls adjustable on the roller turner frame, the roller turner can be used to turn any diameter desired within its capacity. The frame can also be made to carry two tools for turning two diameters at one time. Sizes of supporting rolls depend upon the

diameter to be turned. On small-diameter work, the size of the pins in the rolls should always be smaller than the size of the work to be turned.

Roller Rest Support

The design of a roller rest support is very similar to that of a roller rest turner except that it carries two rolls, which serve to support the work against the thrust from drills and side slide tools, but does not carry a turning tool. This support is clamped onto the tool slide in the same manner as the turner, and can be used in any spindle position of the machine.

The rolls are positioned in the same location as the rolls of a roller rest turner, if a support is needed in that position. Like the roller rest turner, roll sizes and adjustments depend upon diameters to be supported and the capacities for which the support is made. The accompanying drawing, Fig. 5, shows two different types of roller rest supports, both right and left hand.

"V" Supports

There are times when inability to obtain clearances in a given position makes the use of a roller rest support impossible, yet support of some kind

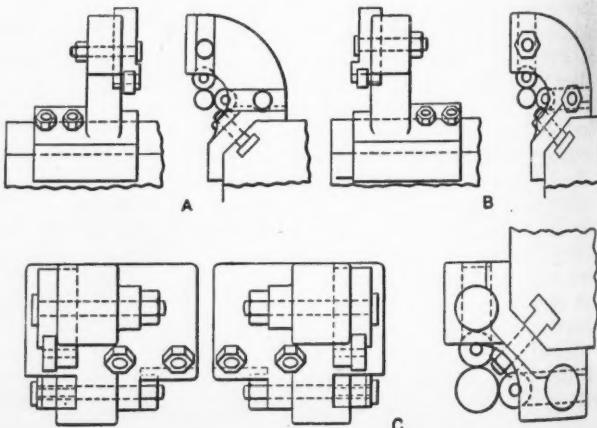


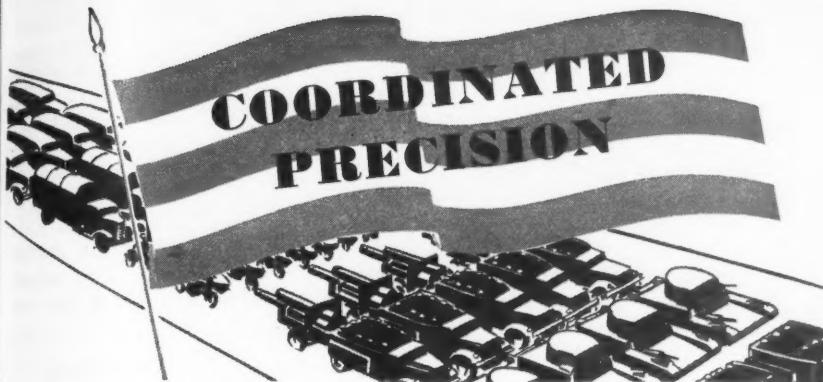
Fig. 5—Drawing of Right and Left Hand Roller Supports

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The defense program of industrial production again emphasizes the critical need for a thoroughly reliable means of checking the lead of screw threads and rack teeth.

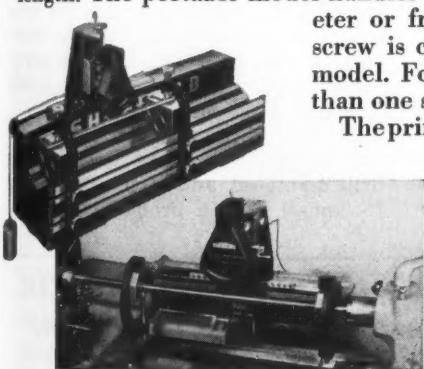
The Sheffield Thread Lead Checking Instrument is the ultimate in accuracy and speed—checking with precision gage blocks as the reference. And no special skill is needed, for anyone familiar with inspection procedure can handle this instrument.

There are two models, one for use on the bench, and a portable model which may be used on work still in the thread cutting machine, without removal.

The bench model handles screws up to 6" in diameter and 30" in length. The portable model handles screws from 1" to 4½" in diameter or from 2" to 6". Twelve inches of screw is checked at one setting by either model. For screws longer than that more than one setting is made.

The principle of magnification is the well-known combination of Reed Mechanism and light beam lever, used in the Sheffield Visual Gage. The action of this mechanism is always positive, instantaneous and frictionless.

Write for descriptive literature



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is necessary. In such a case a "V" support will do very well. As shown in Fig. 6, the V support consists

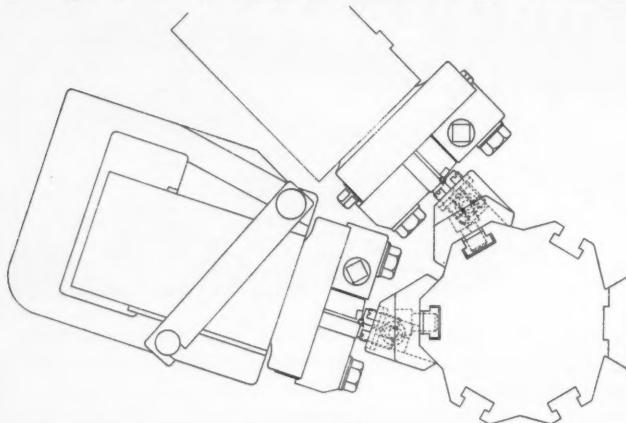


Fig. 6—Drawing of "V" Support Used with Shaving Tool

simply of two bars chamfered on one side, placed together, and mounted in a bracket on the tool slide with adjusting screws making either side adjustable for diameter and pressure. The support shown in this drawing is used in connection with a shaving tool and holder on a cross slide where a two-roll rest support could not be used due to interference.

Boring Bars

The design and uses of boring bars are generally understood; solid bars for the smaller holes and heavier

bars, carrying toolbits, for the larger holes. For the average plant it is more economical to purchase boring bars than to make them. Practically any kind of bar can be used as long as it can be held rigidly to eliminate chatter and allow adjustment of the tool.

Drilling

Since the tool slide will have the feed best suited for tools used on the O.D. of the stock, the cutting speed

of the drill should be calculated to avoid trouble. The correct spindle speed at which to run any job is determined by the cutting speed that can be used on the outside of the bar; hence, when drilling, the cutting speed of the drill is calculated from the speed of the spindle and the diameter of the drill and thus is necessarily lower than the cutting speeds for other tools on the job.

If there is not too much difference between the size of the stock and the drill diameter, and if the drill is not too small, it can probably stand the

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for Work Up to 6" Wide

For cleaning and finishing castings, dies, stampings and any work that can be ground. Gives a straight line finish, leaves sharp edges, eliminates hand labor. • A compact, durable, smooth-running machine with quick, convenient adjustments.

Other Belt Surfacers and Polishers—Tool and Cutter Grinders—Sensitive Drills.

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slower speed. But where the difference in diameters is too great, a high speed drilling attachment should be used to increase the drill speed. And this will include most cases.

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Reaming and Counterboring

Reaming technique, like that of many other operations, is governed largely by the kind of job to be done and the kind of material to be reamed. The spiral flute reamer with right hand spiral is usually used. When aluminum or other soft materials are to be reamed, the angle of spiral on the reamer is sometimes increased so that the chips will back out faster and avoid clogging in the flutes of the reamer.

Since reaming can be done at double the speed of a drilling or boring operation, attachments which accelerate the reaming operation and which can be mounted on the tool slide can be used. With such an attachment, a hole that has required two spindle positions to drill or bore can be reamed in one position, sometimes along with the cutting off operation. Two- or three-step reamers which ream several diameters in one operation can be used, saving the other positions for other tools.

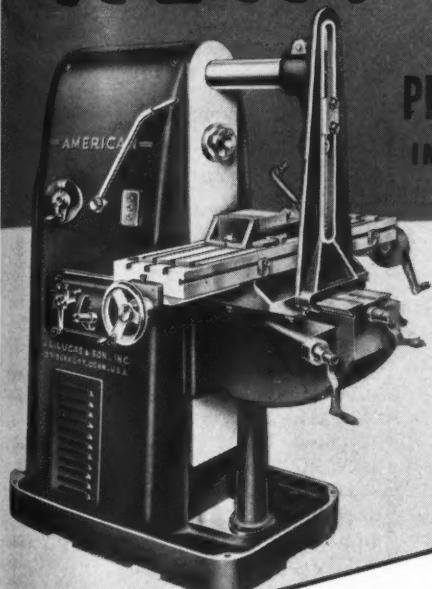
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The counterbores used on multiple spindle automatics are the same as those used for like operations on

shows the design of the box turner, a bar of stock large enough to machine a head for supporting either

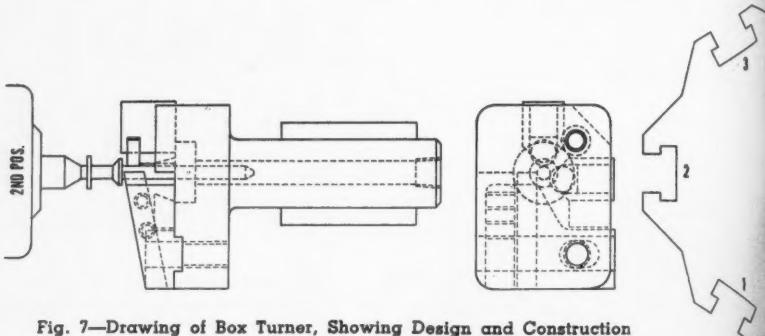


Fig. 7—Drawing of Box Turner, Showing Design and Construction

other machine tools. They can also be made with straight or spiral flutes. However, a counterbore usually removes much more material than a reamer and is frequently used to face shoulders inside of a hole, consequently it must be held rigidly in the tool holder and the feeds must be slower than for a reamer.

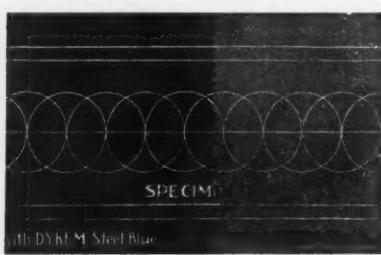
Box Turners

Box turners, or finish turners, as they are sometimes called, are used when a good finish and exact sizing are necessary on a small diameter, or on a set-up where other tools do not permit the necessary clearances for a roll rest turner. The drawing Fig. 7

one or two cutting tools and two supporting rolls, with a shank held in the tool holder. The cutting tool can be adjusted to cut from any position necessary to provide clearances. The shank of the turner is sometimes drilled to carry a bushing in which a small drill is held, or to supply coolant to the tool.

Catheads

The cathead is used for counterboring, internal facing, turning, or trepanning on work of the large sizes. The drawing Fig. 8 is an illustration of a typical cathead. In this case the cathead holds five tools, with a shank to fit the tool holder of the machine



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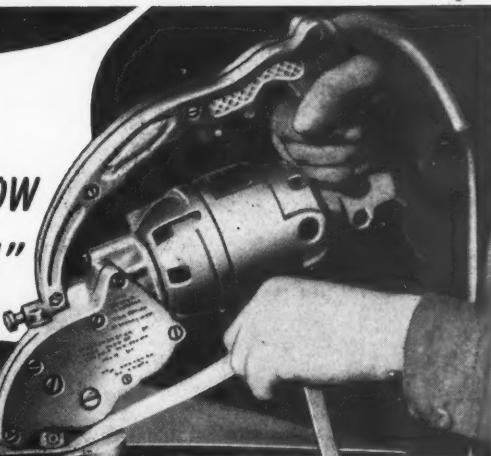
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MODERN MACHINE SHOP 129

upon which it is to be used.

Note that one tool is used to turn the inner hub and face the adjoining

ners after trepanning.

Catheads are especially useful when machining operations are to be per-

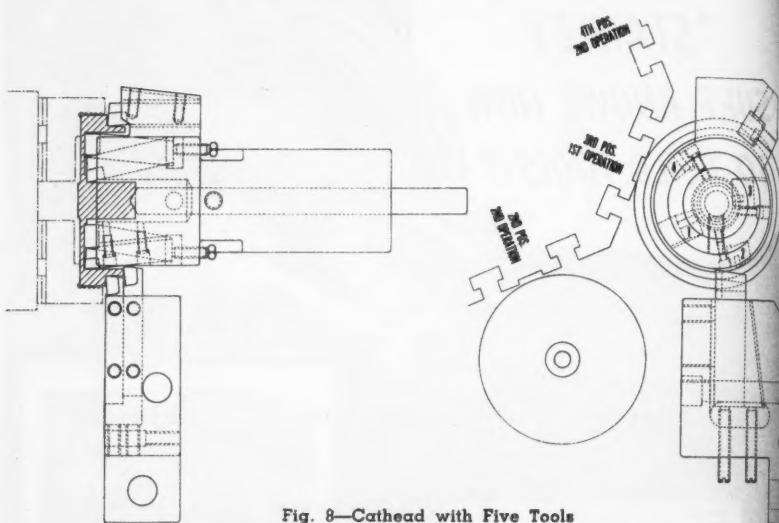


Fig. 8—Cathead with Five Tools

shoulder. One tool bores the hole in the piece while two tools face the end. Another tool turns the outside while cross slide tools are used to face the outer shoulders. There are more tools in this cathead than are usually used, but it provides a good example of the work for which it is adaptable.

The drawing Fig. 9 shows a simpler type of cathead, with only three tools; one for boring, one for trepanning, and one for chamfering the cor-

formed on castings or forgings chucking automatics where there are several faces to be machined, all which have to be rough machined first. All of the roughing can be done in the first or second position, providing more opportunity for finish turning, facing, reaming, threading, and so on.

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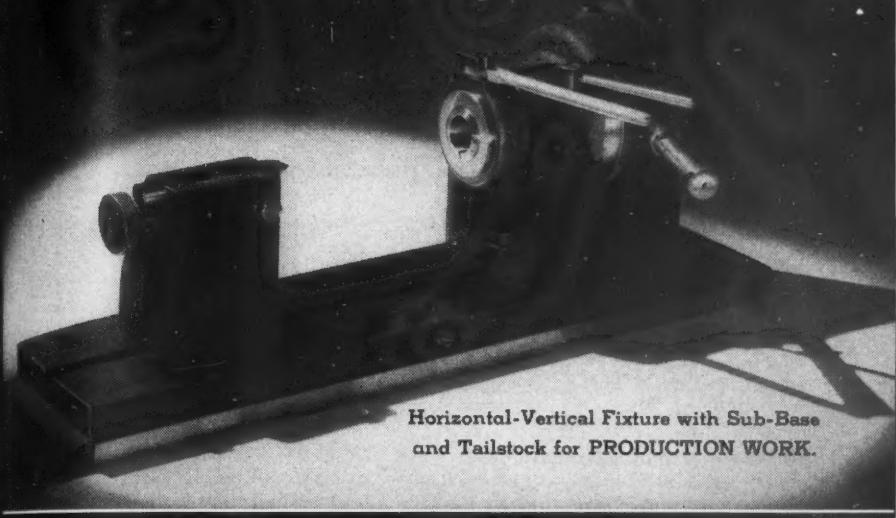
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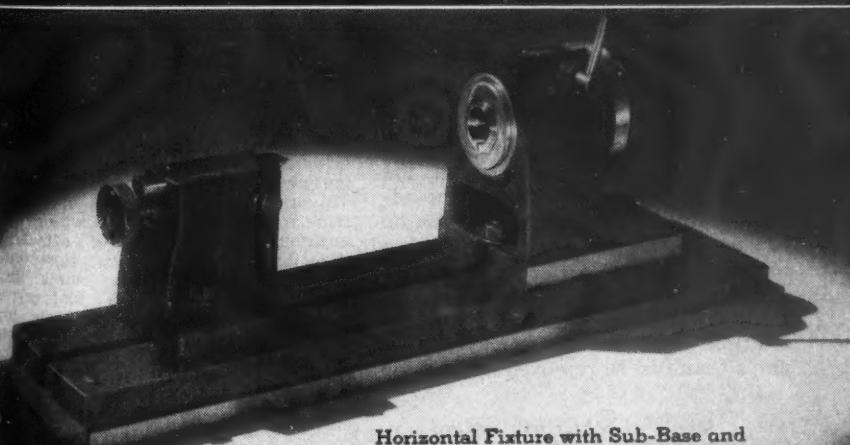
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die heads which have circular form chasers for use on multiple spindle automatics has gone a step further and made it a double duty tool. When used for threading, the chasers are mounted outside of the head, allowing a thread to be cut up against a shoulder. All of the chasers are set for size in a single adjustment.

The head is also arranged so that the chasers and chaser blocks can be removed and multiple circular cutters substituted, thus converting the tool into a hollow mill for finish turning—a tool that will produce a smooth fin-

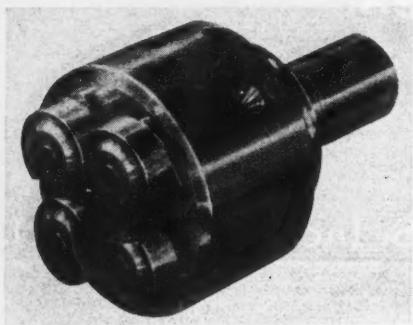


Fig. 10—Namco Hollow Mill Head

ish as well as close limits of size. Upon reaching the end of the cut, the head is opened by the yoke, spreading the cutters so that the tool can be backed off the piece without leaving tool marks.

A further advantage inherent in the circular hollow mill is that the multiple cutters will remove more chips than can be removed by a single

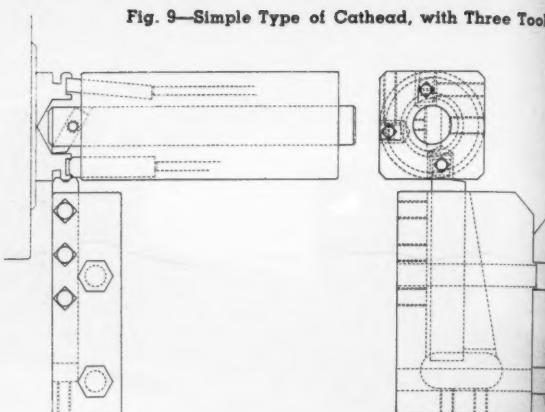


Fig. 9—Simple Type of Cathead, with Three Tools

point tool. Also, inasmuch as the tool operates like a forming tool, separate tool adjustments for different diameters after grinding the tool are avoided.

The operator will find it much easier to set up the job where tools of this kind are used. One adjustment sets all the cutters on the head for size. Inasmuch as three or more circular cutters are used, the tool will last much longer between grinds. Here is another case where good planning is economy, not only in the number of tools required, but in job efficiency and costs of operation.

Fisher Products Bulletin. The Fisher Tool Co., 218 Centre St., New York, N. Y., is now distributing a 24-page bulletin describing and illustrating milling attachments, end mills, rotary files, wire and dry cut power saws, hexagon belt turrets, ball turret heads, magnetic chucks, steel letter and figure stamping lathe chucks, milling machine vises, demagnetizers, metal-cutting band saws, universal dividing heads, etchers, electric markers, small polishing lathes, automatic collet closing attachments, threading dial indicators, taper attachments, draw-in collet chuck attachments, vernier calipers, tool post turrets, angle and surface plates, industrial diamonds, step blocks, live center welders, and various other products. Copy free upon request.

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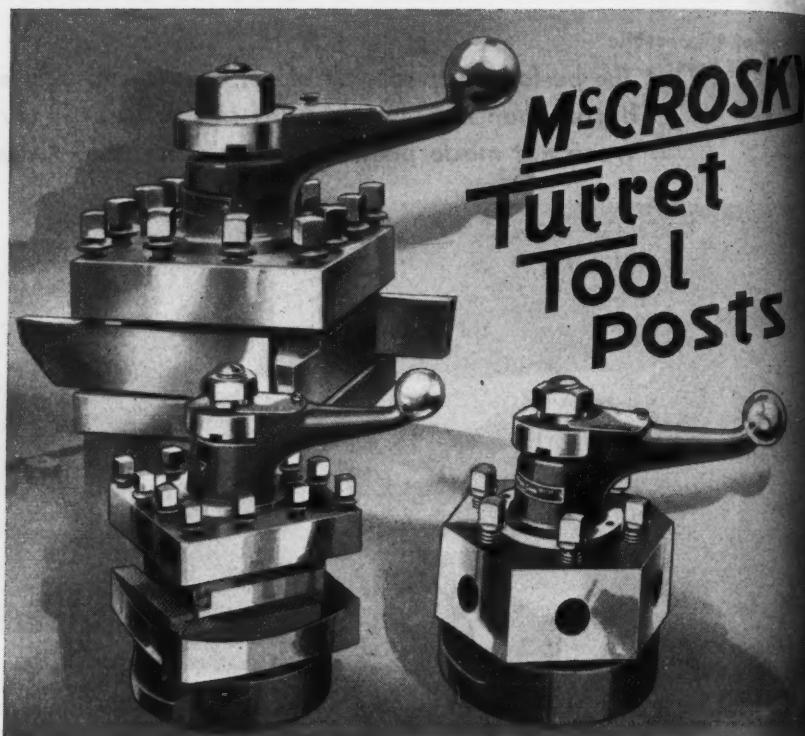
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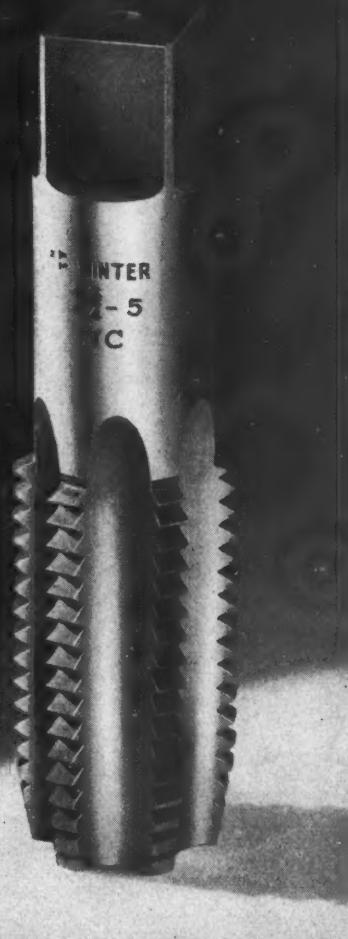
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Progress in Controls for Machine Tools

By JOHN W. HARPER

Industrial Dept., General Electric Company

ELECTRICAL controls, particularly for machine tools, have undergone tremendous changes in recent years. Twenty to 25 years ago textbooks on electricity touched only very lightly on the control question, and referred principally to railway control. Practically nothing was said about control for industrial uses. As a matter of fact, controls of a sort were available, but were far different in appearance and functioning from those now in use.

Then, a great many machines had manual starters, often open, with no protection against accidental contact with live parts. Magnetic control, when used on machines, was of the simplest type, as a rule consisting only of something to start and stop the motor and protect it against voltage failure and overloads. There were

a few applications such as planers and some milling machines where something other than simple starters were used.

Machines had often only one or two motors, most functions being actuated mechanically. On planers and milling machines there were some electric feed applications in which the main drive and feed had separate motors that had to be interlocked. In the case of the planer, the feed would only operate at the end of the stroke, although for traverse purposes, the same motor could be used at other times—properly protected of course, against getting the wrong combination.

Milling machine feeds had to be so arranged that the spindle motor had to be running before the feed could be started, and also so that it could stop last. These examples are elementary, and are still with us, but they illustrate one reason for the drift away from manual controllers to magnetic. Such interlocking would have been out of the question with the manual devices.

Another reason for this change was the greater ease and flexibility obtainable with magnetic devices. This ties in with the previous examples, but also involves the question of physical exertion required to operate large manual controllers and the ne-



Fig. 1 — G-E Pendant - Type Push - Button Station with Anodic Finish and Rod-Operated Stop Button. Height, Approximately 17 Inches

cessity of the operator's going to the device to operate it, as in many instances the controller could not be located conveniently to his operating position.

With magnetic control, even of the simplest kind, all the operator had to worry about was a small push button station, which, if the character of the machine made it desirable, could be hung from a flexible cable or be made portable. In other words, the operating point for the electrical equipment could be located as closely as possible to the mechanical operating center.

It is doubtful if the multi-motored machine would ever have developed into its present form without the availability of magnetic controls to make it function. In days gone by the planer-type milling machine, for instance, had one large motor on top of the cross girt which drove all form heads through a complexity of spline shafts, screws, gears, and so on. Breaking this down to individual motors did not necessarily require magnetic controls, but when it became necessary to insure one or more spindles running before starting the feed, or slowing down the feed if the cutters were overloaded, then magnetic control was the only solution.

It should not be assumed from the foregoing that there is no field for manual control. Quite the contrary. In small sizes where the devices are not too bulky, many are still used. In certain intermittent operations not interlocked with other functions, such as tool carriage traverse, small drum switches are still in use, arranged to stop the motor as soon as the handle is released.

Manual switches are often employed for infrequent speed changing on multi-speed a.c. motors. Even some modern lathes with d.c. motor drives frequently have drum switches operated from the carriage through a

splined shaft. Manual starters are often used for small pump motors where they give overload protection and where they can even interlock the main drive, if the latter is magnetic, by providing an extra contact so that the pump motor must be running before the main drive can be started.

These examples do not alter the

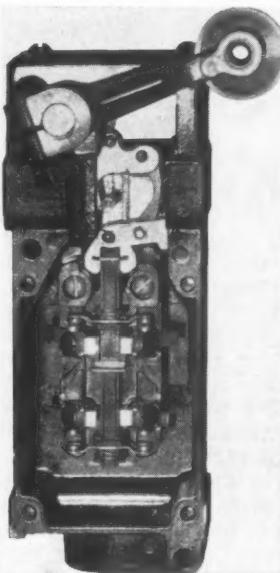


Fig. 2 — G-E Track-Type Snap-Action Limit Switch, Without Cover, With Lever and Contacts in Normal Position

basic fact, however, that electrified machines would never have achieved their present stage of development if we had had to depend on manual controls.

A real progressive step, therefore, was the intensive efforts which were put on the development of magnetic controllers, and with them the necessary accessories such as push buttons and limit switches. Our discussion of progress in control is, then, largely concerned with progress of magnetic

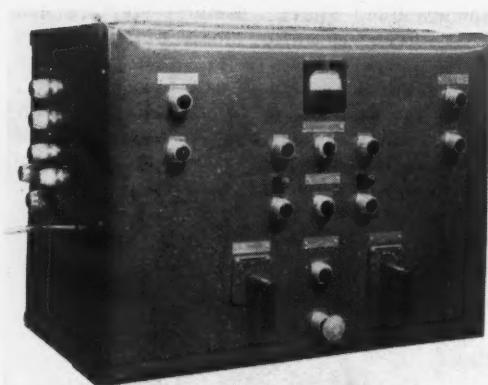


Fig. 3 — G-E Magnetic Control Left-Side Oblique Front View showing Push Buttons, Speed Indicator, Indicating Light, and Select Switches. Approximately 24 inches Wide, 20 inches High, 17 inches Deep

control development.

Not the least important in this connection was the reduction in size, particularly for small alternating current starters for full voltage starting of polyphase motors which still form the majority of machine tool starters. Twenty years ago a full voltage starter for a 5-h.p., 220-volt, 3-phase motor was approximately 11½ inches wide, 13½ inches high by 6½ inches deep. About 1927, the size was reduced to 6½ inches wide, 9½ inches high, and 4¾ inches deep. Just recently there has been a further reduction to 6½ inches wide, 8½ inches high and 4 inches deep. At the same time the price has dropped approximately 33⅓ per cent.

Not only was the size of the starter reduced, but the appearance

was changed much for the better. The old switch was a rectangular box which did not look well on any machine. Today's switch with its rounded corners is much more adaptable to machine mounting and blends in better with the machine contours.

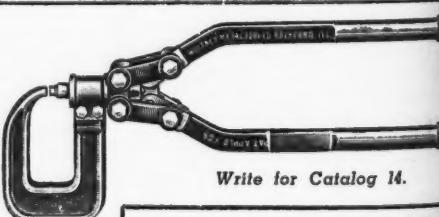
This reduction in size of device has made it possible to make up control panels small enough to be located in machine bases, or if they are put outside they can be better suited to the machine's design. They also help when it comes to making up large floor mounted panels for multi-motored machines. To take care of a number of motors, with the many interlocking relays required, would make a prohibitively large panel were it not for the availability of these small devices.

All the undoubted advantages of magnetic control would have to "blush unseen" if we did not have push buttons and limit switches to guide the control in the way it should go. Old time push buttons were

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twice as big or even bigger than present forms. Frequently the push button is about the only evidence of electrical operation, and now even it can be made inconspicuous.

For many years, push buttons were available only as complete stations. For machine work, however, there was a definite need for individual units which could be incorporated in the machine design. When these were made available, they were also oil-proof and arranged to be mounted by merely drilling a hole, making their use as simple and effective as possible. Units were also brought out which included indicating lights in the button itself, thus saving an additional unit.

A development of recent years has involved push button stations of the pendant type. Years ago a 2- or 3-button pendant station was the only type available, and that usually was a station for wall mounting, supplied

with conduit fittings. Now pendant stations are listed up to 11 units, and many special ones have been built which include selector switches, indicating lights, and even speed-indicating instruments.

A reversing planer drive is a good example of this development. In the early days of planer electrification the things the operator had to do paralleled very closely his motions with the old belt driven machines. Consequently he started and stopped the platen by leaning over and setting the reversing master switch in neutral as he had been accustomed to do with his belt shifter lever. He inched the machine by means of a 2-button pendant station—but not until after he had operated a transfer switch, usually around on the side of the machine. Now all functions, both automatic and inch, are obtained from a 5-button pendant switch, or even from two, one on each side of

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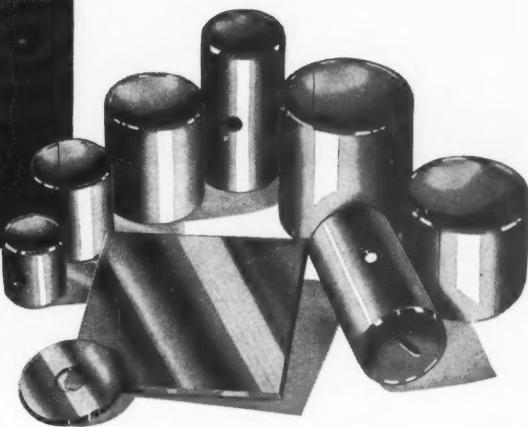
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Here is a new and unusual bearing material that has already established many new records of performance. *Pre-Cast Bearing BRONZE ON STEEL*, a thin wall, laminated type of bearing, combines the bearing qualities of bronze with the strength of steel.

The bronze alloy—S.A.E. 64, in powder form—is permanently bonded to strip steel. The process of manufacturing bearings or bushings from *Pre-Cast Bearing BRONZE ON STEEL* is essentially a stamping and forming operation. As a result, few bearings are as economical as *Pre-Cast Bearing BRONZE ON STEEL*, particularly when there is production quantities.

Pre-Cast Bearing BRONZE ON STEEL is also available in rolls—up to 400 feet in length—or as plates, washers or various types of stampings. It will pay you to investigate this new type of bearing. A request, on your business letterhead, will bring you complete information plus a sample bearing. Write TODAY.



Write for this

folder that fully de-
scribes this new and
unusual bearing. It's
FREE.



JOHNSON BRONZE

Sleeve BEARING HEADQUARTERS

590 S. MILL STREET • NEW CASTLE, PA.

RUTHMAN
GUSHER
COOLANT PUMPS

**Uncle Sam says:
 "SPEED UP"**

Built-in motor, sturdy vertical shaft on ball-bearings, double suction intake giving balanced impeller . . . these and other famous time-saving Gusher features help SPEED your jobs.

Write for information!



Model 2-P3

Speedier deliveries now, because of Ruthman's enlarged manufacturing facilities.

P3 models are available in external right or left discharge types, flange-mounted and immersed models.

Pat. and Pats. Pend.

**Write for engineering data
 and specifications.**

THE RUTHMAN MACHINERY CO.
1817 READING ROAD, CINCINNATI, OHIO
 LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

the planer, if it is large. Strange as it may seem, there was opposition to the use of the pendant, many preferring to stick to the old method of control.

Many other machines—large milling machines, horizontal boring ma-



Fig. 4—G-E Operator's Control Panel for Use with Miller-Type Planer Control Panel. Designed for G. A. Gray Company, Cincinnati, Ohio

chines, boring mills and others—are now controlled wholly or in part from pendant or portable stations having as many as 25 or 30 push buttons, selector switches and indicating lights.

Limit switches comprise another very important group of accessories which have progressed upward in the past few years. With them, as with

Strange
position
any prefer-
method of
large mil-
poring ma

"Pac-k-less" Air Control Valves

offer a complete line to choose from



The advantages of positive, accurate control of air operated equipment are available for any type of application, for Hannifin Valves offer a complete range of choice in hand and foot operated models, adaptable to every production need.

All types give you the Hannifin disc-type design that has no packing, and no leakage or packing maintenance troubles. The bronze disc that controls air flow is ground and lapped to form a perfect seal with the seat. Wear is negligible, yet, if necessary after long service, simple re-lapping restores the original efficient seal.

Hannifin Valves are made in 3-way and 4-way types for various standard cycles of operation for control of single or double-acting cylinders. Available in the following models: standard hand control valves; duplex valves for control of two double-acting cylinders; spring return for instant reversal upon release of foot pedal or hand lever; heavy duty rotary valves; foot operated treadle valves; electric models for remote control; manifold type for control of several units; pressure regulating valves.

WRITE for Valve Bulletin 34-MM with complete data on all types.

HANNIFIN MANUFACTURING COMPANY
621-631 South Kolmar Avenue • Chicago, Illinois

HANNIFIN "Pac-k-less" **AIR CONTROL** **VALVES**

other control, the trend has been toward smaller but more rugged and more generally useful devices. Latest developments include snap - action switches using alnico permanent magnets for getting accurate points of throwover, and which have stood up under millions of operations.

Switches much smaller than anything before available have been made up with various types of operating heads to meet numerous requirements of mounting and operation. These are all provided with oil proof enclosures to make them most suitable for the conditions encountered on machines.

Small switch mechanisms have been produced which can be mounted in the machine, for operation by levers in the machine, and thereby make a very compact installation. In such a case the machine housing serves as the protecting enclosure for the switch.

Motor-operated field rheostats are quite old and common, but it has only been within the past three or four years that a compact, inexpensive mechanism has been available which can be used on small machines. This drive can be used on plate-type or dial-type rheostats, and can be readily incorporated in a control panel design. This makes it a simple matter to obtain speed adjustment by remote push button control, as, for instance from a pendant switch.

In conjunction with a simple tachometer and instrument the operator can always know just what operation he is getting. These mechanisms find a place on the plate planer, horizontal boring machine, boring mill, milling machine, and any other application where it is desirable to control a d.c. motor speed from a distance.

To make the wiring up of machines more trouble free, especially when oil is present, a new type of wire insu-



"ALL-IN-ONE" EQUIPMENT FOR GRINDING AND LAPPING

Carbide Tipped Tools, Alloy and H.S.S. Tools

BENCH TYPE — PEDESTAL TYPE

Equipment as shown includes diamond lap, 60 grit wheel and 110 volt, 60 cycle, A.C. motor. Other voltages extra. DELIVERY FROM STOCK.

Pre-loaded ball bearings 6" x 1 1/2" wheels, 1750 r.p.m.

Accessory equipment for grinding chip control grooves, for cutting carbide tips and for sharpening twist drills.

Write for Bulletin

T. C. M. MFG. CO.
HARRISON Since 1910 NEW JERSEY

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Cut Down Rejections with



MASONITE DIE STOCK

Masonite Die Stock used as assembly fixture and drill jig for leading edge of airplane wings manufactured at the Vought-Sikorsky Aircraft Division, United Aircraft Corporation, Stratford, Connecticut.

MORE SPEED—less weight—reduced cost—few rejections!

Assembly fixtures are being produced in a fraction of the time formerly required by using the new and improved Masonite Die Stock. The speed with which it may be worked plus its comparative light weight and high strength are some of the reasons the aircraft builders specify Die Stock for this purpose. Drill bushings may be inserted to combine assembly and drilling in same operation.

Masonite Die Stock is only about one-sixth the weight of steel . . . is easily pro-

duced in the pattern shop with high-speed wood-working tools. *This semi-plastic material eliminates the scratching of aluminum alloys, thereby cutting down on rejections.*

Dies made of Masonite Die Stock are also being welcomed into many other industries that work with thin gauges of stainless steel and aluminum or magnesium alloys, in sheet form.

Masonite Die Stock is available in thicknesses of $\frac{1}{4}$ to 2 inches . . . in sizes of 48 x 72 inches and 48 x 144 inches. For further particulars, just fill out coupon.

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MASONITE
CORPORATION

Dept. MM-2, 111 W. Washington St., Chicago, Ill.

Please send me illustrative literature and complete information about Masonite Die Stock.

Name and firm _____

Address _____

City _____ State _____

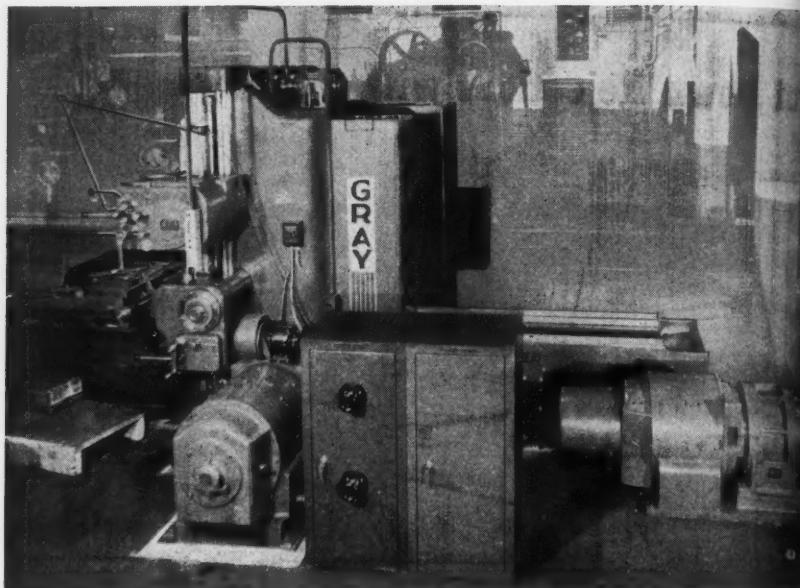


Fig. 5—G. A. Gray Double-Housing Planer, 42 x 42 x 12 Feet, Driven by G-E 35 H.P. Variable Voltage Planer Drive with Speed Range of 40 to 1,200 R.P.M. on Motor, Giving 8 to 240 Feet per Minute Platen Speed

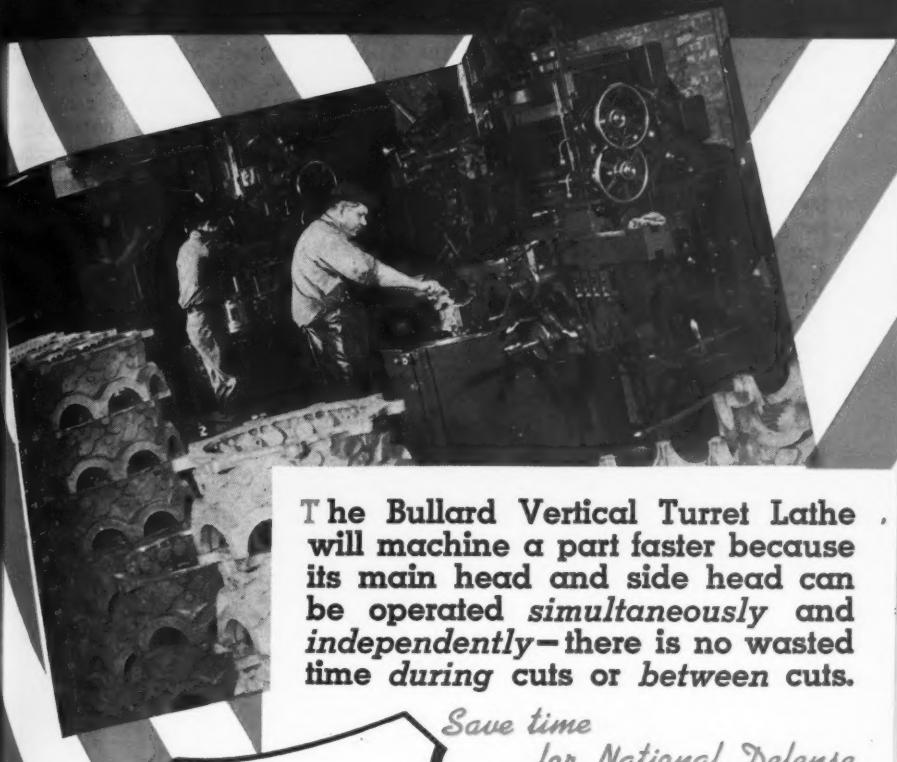
lation unaffected by cutting or lubricating oils has been put on the market in the past few years. Over a mile of this wire was used on one large boring mill alone. This wire is available in nine standard colors, so that tracing circuits can be simplified. It is also acid and moisture resisting, with longer life, and has a smooth finish so that dirt will not adhere to it.

Definitely new methods of control have been improved or developed. The Ward-Leonard or "variable voltage" scheme of speed control has been known for many years. Only limited applications had been made of it, principally in large installations such as steel mill main drives and mine hoists. It was relatively expensive, requiring a 3-unit motor-generator set regardless whether a.c. or d.c. power was available, and this worked

against it. The actual control requirements in the way of relays, and so on, are somewhat simpler than for constant voltage drives. Variable voltage control has definite inherent advantages such as the possibility of a wide speed range, and admirable accelerating characteristics. Because of these its field of application has been increasing of recent years. Now many machine tools are provided with variable voltage motor-generator sets in fractional horsepower capacities.

Grinder headstocks, grinder and milling machine tables, horizontal boring machine feeds and traverses and reversing planer drives are recent instances of the use of this old scheme in modern machines. In some cases a combination of Ward-Leonard (or generator field control) and motor field control makes it possible to go

V...for VICTORY in the SHOP



The Bullard Vertical Turret Lathe will machine a part faster because its main head and side head can be operated *simultaneously* and *independently*—there is no wasted time during cuts or between cuts.

*Save time
for National Defense*

BULLARD
VERTICAL
TURRET
LATHES

load fast
cut fast
save time
between cuts
are accurate

THE BULLARD COMPANY
BRIDGEPORT, CONNECTICUT

speed ranges as high as 30:1 or 60:1 in special applications.

The Ward-Leonard scheme basically involves the operation of a d.c. motor over a speed range by varying the voltage applied to its terminals. This variation in voltage is obtained by changing the excitation of the generator supplying power to the motor. This, of course, means a generator for each motor whose speed is to be varied. The method is known by various names as Ward-Leonard, variable voltage, adjustable voltage, or generator field control—all meaning the same thing.

An entirely new control method, still so new as to not have many applications on machine tools as yet, but which is used rather extensively in other industrial applications, is the use of vacuum tubes. Certain combinations have been widely used.

The popularly called "electric eye" has found many industrial applica-

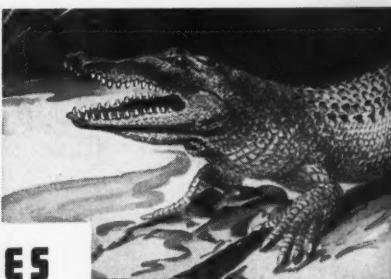
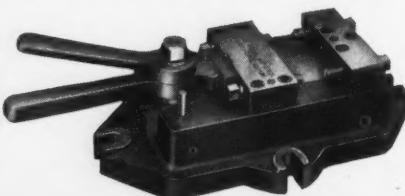
tions such as for keeping the thread straight in weaving cloth, registering in printing, perforating stamps and the like. A timing relay incorporating a vacuum tube for the timing element has been successfully used on certain machines where a definite timing function was required. There have also been applications where automatic remote speed control of d.c. motors has been obtained by means of a thyratron tube controlled through a cam-operated reactor.

Some attempts have been made to use vacuum tubes as an intermediary to permit operation of motors over a speed range directly from a.c. power but so far nothing has been entirely satisfactory for use with the commonly-used motor sizes. Neither do present tube characteristics lend themselves to applications where the speed has to be changed suddenly, as might be the case on practically any machine designed to operate on a

POWERFUL JAWS with Hair Trigger Speed!



Quick-Action VISES



When a Fenn Quick-Action Vise takes a grip on a piece of work you can be sure it is there to stay until you release. There's no slow motion action about a FENN. It's all speed because the Levers pull the jaws up quick, tight and solid. That's why Fenn Quick-Action Vises are used in the big plants and are so highly praised by operators. Send for full information to Dept. A.

THE FENN MANUFACTURING CO.
HARTFORD, CONNECTICUT

How can this gun hit an
enemy ship 25 miles away?



This 16 inch coast defense rifle is Uncle Sam's largest gun. To aim it accurately at a moving target 25 miles offshore requires calculations so intricate that few laymen can hope to understand them. Yet all these calculations would be discounted by the slightest imperfection in the gun's huge barrel. Consequently the bore must be brought to microscopic accuracy—and this is where Carborundum Brand Abrasives are making one of their most important contributions to defense.



This seemingly impossible job of finishing a fifty-foot gun barrel is done with a giant honing machine equipped with Carborundum Brand Abrasive Sticks. Similar hones are helping to produce engine cylinders, bearing races, fuel injection pumps, and thousands of other products requiring an accurately finished inner cylindrical surface.



Honing is only one important abrasive process Carborundum has helped develop. Whatever your use of abrasive products, we can help you speed up production and get better results. Write The Carborundum Company, Niagara Falls, New York.



Carborundum and Alinstic are registered trade-marks of
and indicate manufacture by The Carborundum Company.

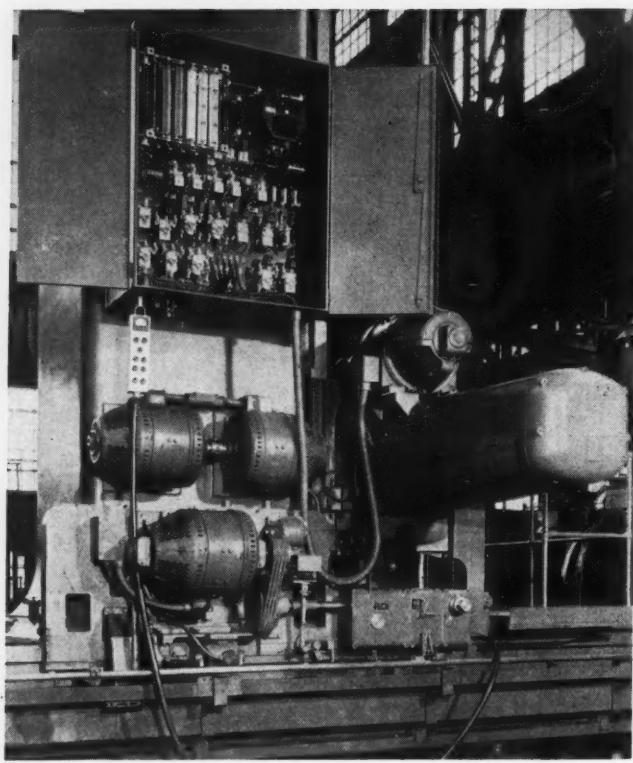


Fig. 6—Sellen Horizontal Boring Machine Equipped with Adjustable Voltage Feed and Traverse Drive Giving 25-to-1 Speed Range and 10-to-1 Overall Range. Feed Motor D.C., 100 H.P., 450/1,800 R.P.M., 230 Volts. Spindle Motor D.C., 25 H.P., 1,750 R.P.M., 230 Volts. Includes Portable Push Button Station for Complete Control of Machine and Motor-Operated Field Rheostat for Generator and Feed-Motor Fields

automatic cycle.

The principal element of progress in machine tool control has been the gradual development of devices and combinations of devices which make it possible to operate complex machines with the greatest ease and with maximum flexibility in securing the functions desired.

A plate planer is usually a comparatively simple machine, yet in the last five years six or eight of these machines have been built with elaborate electrical equipment. As a result, the operator, riding on the carriage, has entire control of the machine from a master control panel in front of him. This panel contains push buttons for inch or automatic

operation in either direction, speed change through a motor-operated rheostat, complete control of feed and traverse motions, the tool head selector switch for tool lift, control and carriage speed indicating instru-

ment. Feeds are readily adjusted by a feel limit switch which permits the feed motor to run only a preselected amount at the end of the stroke.

Several horizontal boring machines practically 100 per cent electrified have been built in the past two or three years. In these, complete control is obtained from a portable push button station, which includes a feed speed indicator and push buttons for changing speed. A feature of these machines is a variable voltage (Ward-Leonard) drive for the feed motor, giving feed speeds of 14 inches per minute, with a traverse speed of 60 inches per minute, obtained from the same equipment by merely pressing a traverse button.

Sellers Engineering Mfg. Co. - Volute and Traveling 25-ton Range and 1-ton Travel. Rotor D.C. 1,800 R.P.M. 1.5 HP. Spindle C., 25 HP. M., 230 Volts. Portable Cotton Stone Complete Control Line and Receptacle. Fit for Garage Feed-Motor Fields



BOUT of the O'TOOLS (ROUND 3)

10 ROUNDS - AIR VS. HIGH-CYCLE GRINDERS
HIGH-CYCLE BEATS AIR on this DEFENSE JOB

SET-UP:

At Diebold Safe & Lock Co., Canton, Ohio.

Job: Finish grinding armored bodies for scout cars. Had both AIR and HIGH-CYCLE Tools. Needed more tools for defense production. Air pressure was low.

The Rotor Analyst considered all angles and recommended HIGH-CYCLE Grinders with these results:



SCORE:

HIGH-CYCLE takes Round 3 in the Bout of the O'Tools with these wallopers:

Doubles production with fewer tools. 10 HIGH-CYCLE tools replace 15 AIR tools and do the work twice as fast.

Half the effort. Operators like HIGH-CYCLE tools because of easy portability to all parts of cars. (No hose to lug.)

Saves 60% in first cost. (Frequency changer costs less than air compressor.)

Saves 75% in power cost.

ASK THE ROTOR ANALYST HOW TO BOOST YOUR OUTPUT

How can you speed up production of your present AIR or HIGH-CYCLE installation? Want to increase its capacity and minimize the investment cost? Want to reduce outage time of your tools?

Ask the Rotor Analyst for his unbiased suggestions. No obligation.

The Rotor Analyst has 65 different AIR tools and 59 different HIGH-CYCLE tools with which to solve your problems.

THE ROTOR TOOL CO.

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

HIGH CYCLE

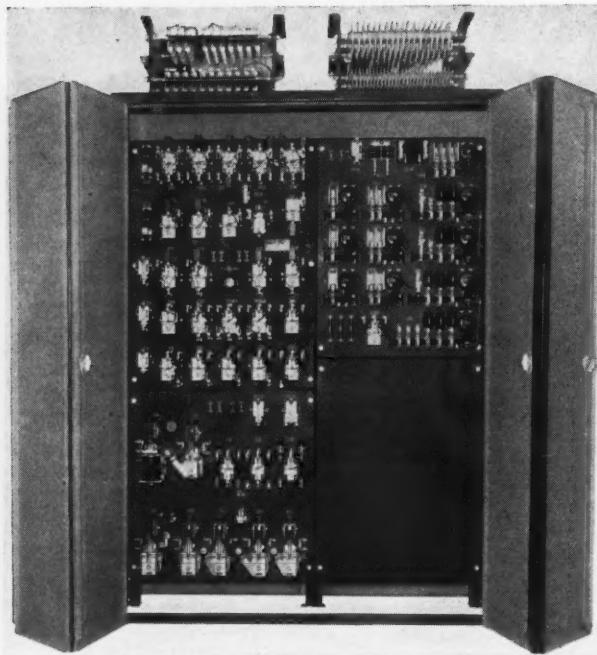


Fig. 7—G-E Reversing D.C. Miller-Type Planer Panel Including Control for Planer Motor, Feed Motor, Rail Motor, Right Traverse Motor, Rail Clamping Motor, Clutch Motor, Spindle Motor and Pump Motor. Approximately 113 Inches High, 70 Inches Wide, 27 Inches Deep.

The electrification of these machines has been much expedited by the development of smaller control units of various types which made it possible to include the control inside the machine base in many installations.

The development of new and better

machine tools goes hand-in-hand with developments in electrical control and motors. Without the aid of the electrical devices modern machines would be far more complicated both in operation and control than is now the case. In fact, it is doubtful if some could even be built unless electrified. The moral is: put the power source as close as possible to the load, and the control unit where the operator needs it.

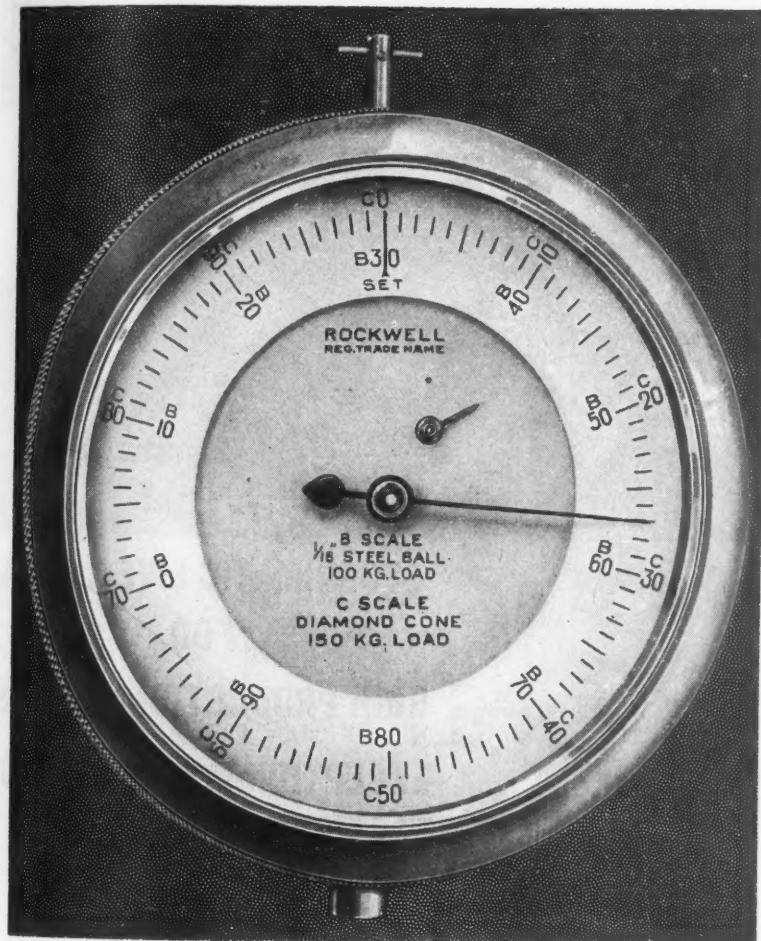
Mahr Stress Relief Furnace. A four page bulletin illustrating and describing a car bottom, convection type, rectifying, stress relief furnace with refractory interior ducts is now being issued by the Mahr Mfg. Co., Division of Diamond Iron Works, Inc., Minneapolis, Minn. Copy of Equipment Bulletin No 650 available to metal manufacturing plant executives and engineers upon request.

The milling planer has perhaps the most complex requirements of any present-day machine tool. An entire master control panel is required for the various rheostats and interlocking selector switches necessary for setting up the different combinations needed. After these are set up the operator then has control from an 8-button pendant push button.

The examples mentioned have been all large machines where the size of the electrical controls is correspondingly large and impressive. Smaller machines such as milling machines and grinders may not present such an imposing appearance but the functions required of them, and accomplished by the aid of the electrical equipment, are just as spectacular. In many instances the type of operation is the same, the only difference being that smaller units are used.

E Reversing
Type Plane
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Motor, Feed
Motor, Rapid
Motor, Rail
Motor, Clutch
Handle Motor
Motor, Ap
113 inches
Inches Wide
es Deep

"ROCKWELL" HARDNESS TESTER



One point of hardness on a "ROCKWELL" Hardness Tester means a difference in depth of penetration of only two microns. Twenty-one years of experience in building "ROCKWELL" Testers is the reason everyone has confidence in tests with our equipment.

Concord Ave. & 143rd St.
New York

February, 1942

WILSON
MECHANICAL INSTRUMENT CO., INC.



**LET US
SOLVE
YOUR
CENTER
PROBLEMS!**

**HEAVY DUTY
STURDIMATIC LIVE CENTERS
FOR
HIGH PRODUCTION-LOW COST
EXCEPTIONAL PERFORMANCE
SPEED AND DURABILITY
ACCURACY PLUS**

WRITE FOR CATALOGUE 540

**STURDIMATIC TOOL COMPANY
5222 THIRD AVE. DETROIT, MICH.**

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February, 1942



Symbol FVM
Vertical Type

CENTRIFUGAL COOLANT PUMPS

VERTICAL OR HORIZONTAL

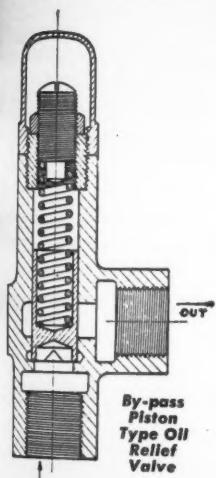
Many types adaptable for all kinds of production . . . or built to special specifications. Every one engineered to utmost efficiency . . . every one sure to give exact position of discharge.

ONE FOR ALL
ALL FOR ONE



PRODUCTS

continue their yeoman task of supplying equipment on which you can rely for precision and skill in production or maintenance.



By-pass
Piston
Type Oil
Relief
Valve

BY-PASS OIL RELIEF VALVES

NON- CHATTERING —PISTON TYPE

No further attention required after once installed and set for desired pressure. For pipe sizes from $\frac{1}{4}$ " to 2". Cast iron or bronze bodies. Brass, hardened or stainless steel pistons.



Specialties Co., Inc.

BLANCHESTER, OHIO

COMPACT...

BUT PACKED
WITH POWER



The Vernon No. 0 Horizontal Milling Machine needs no "babying" on those heavy cuts—a husky one-horsepower motor insures smooth, chatter-free milling with large cutters as well as on high speed end milling and key-seating operations!

The Vernon offers a choice of two spindle speed ranges . . . 100 to 1000 r.p.m. or 150 to 1500 r.p.m. A convenient external handwheel operates fully enclosed variable speed drive—freeing operator from dangerous open belts. Longitudinal power feed is available as a standard extra.

The Vernon Universal Vertical Milling Attachment is extremely useful for high speed vertical mill work. Unit is quickly installed by replacing usual overarm and bracket. Head swivels at any angle—in any plane—making difficult setups easy. Maximum distance between collet end of spindle and table top—10 1/4"—ample for large jobs.



MACHINERY MANUFACTURING COMPANY

1915 EAST 51 ST., VERNON, LOS ANGELES, CALIFORNIA

Vernon Line of HORIZONTAL MILLS, VERTICAL MILLS and
JIG BORERS, SHAPERS and GRINDERS

RESINOID BONDED WHEELS

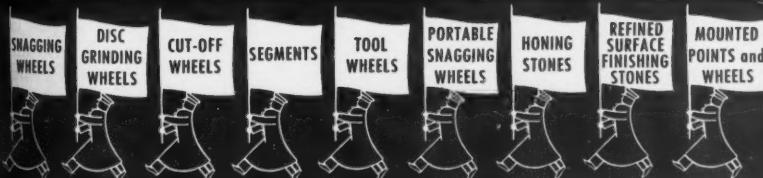
BY
BAY
STATE

BUILT TO BEAT PRODUCTION SCHEDULES

It's for just such rugged, continual use that BAY STATE resinoid bonded products are manufactured.

You know you're equipping your machines with the best when you use BAY STATE products because a high quality reputation supports your selection.

On to victory with more production! That's your aim and ours. March along with BAY STATE!



BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASSACHUSETTS, U. S. A.

Modern Equipment at Work

Nitriding Tank Parts

By ROBERT G. GUTHRIE
Consulting Metallurgist, Chicago, Ill.

AN unusual heat treating operation is the feature in the mass production of nitrided tank tractor pins at the plant of Campbell, Wyant & Cannon Foundry Company, Muskegon, Michigan. Here loads containing as many as 10,000 track pins, weighing 12,000 pounds, are nitrided

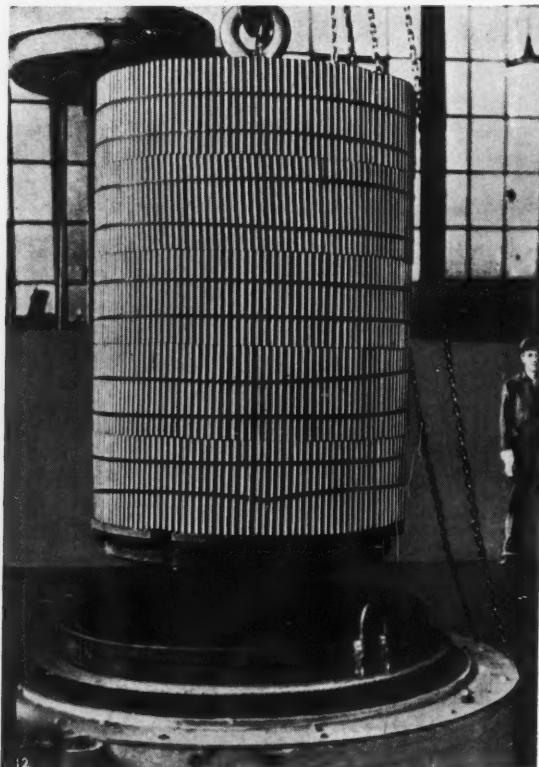
in a single operation. A typical load is shown in the illustration.

The pins, which are each 9 1/2 inches long and 3/4 inch diameter, are used to tie the tractor shoes together in much the same manner as a hinge pin. 140 pins are required for each tank; 70 per side. The pins are of Nitralloy "G" modified steel of the following approximate analysis:

Carbon	30-40
Silicon	30 max.
Manganese	40-60
Chromium ..	1.40-1.90
Molybdenum ..	.15-.25
Aluminum ..	.90-1.40

Prior to nitriding, the pins are heat treated by oil-quenching from 1,650 degrees F. They are then drawn at 1,300 degrees F. This treatment results in the following physical characteristics: 123,000 to 145,000 pounds tensile strength; 15 per cent elongation in 2 inches; 45 per cent reduction of area; 45 minimum foot-pounds, Izod.

In preparing the load for the nitriding operation, a cylindrical fixture is used. The bottom layer of pins is set onto an alloy grid which rests in the bottom of the cylindrical fixture. This bot-



Cylindrical Fixture in which 10,000 Tank Tractor Pins are Nitrided in One Operation

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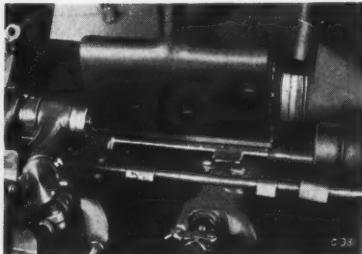
7100% INCREASE IN PRODUCTION

Such an increase appears incredible, yet it actually happened at the plant of a gun manufacturer.

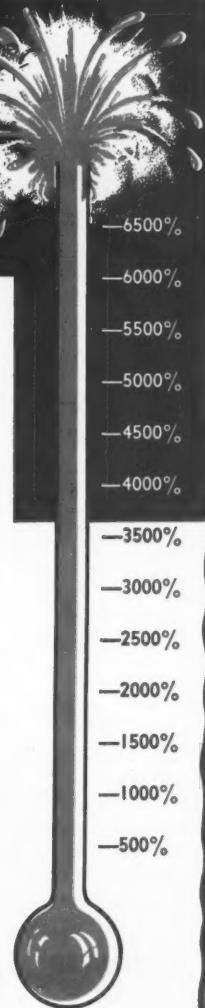
Certain highly accurate control rods having 8 tapered diameters were being hand finished in this plant. Six and one-half hours were required to finish each rod within specified limits. Such methods were clogging production and holding up much needed equipment.

Then a Landis 10" x 36" Type DC Plain Grinder was installed. It was equipped with an 11" face wheel profiled to conform to the diameters of the work so that only one straight infeed operation was necessary to finish grind the rods. A mere 5 minutes were required for each rod--a production increase of 7100%.

Look around your plant. Perhaps you too have some jobs that are now being finished by hand and could be finished much more accurately at a far greater production rate on Landis grinding equipment.



Unusual
Performance
As Usual



385

LANDIS TOOL COMPANY

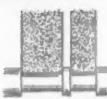
WAYNESBORO
PENNSYLVANIA



IDEAL
FOR GRINDING
STRAIGHT
FACE ROLLS
IN THE SMALLER
SIZES



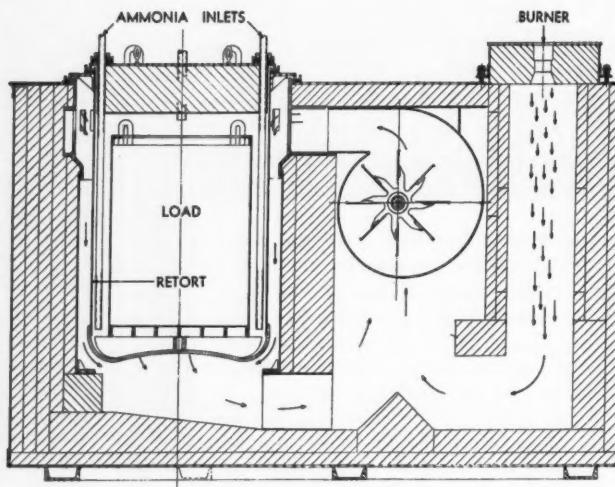
IDEAL
FOR GRINDING
CRANKSHAFT
LINE BEARINGS



IDEAL
FOR MULTIPLE
WHEEL GRIND-
ING

tom layer consists of 2,000 pins solidly packed, and is held together with steel banding. Successive layers

the bottom of the heating chamber and back into the inlet side of the fan for recirculation.



Cross Section of Lindberg Cyclone Nitriding Furnace

are handled in the same manner, and when the five layers are completed, the load is lifted from the fixture and lowered into one of the two furnaces.

Heat generated in the combustion chamber, which is on the right side of the furnace in the drawing, is drawn up by the fan and forced at high velocity under pressure through the annular duct at the top of the furnace, around the retort, down to

uniformity. In the nitriding operation, temperature uniformity plays an extremely important part, as the work will not take on a uniform case unless the temperatures throughout the charge are uniform. This is the reason why the Campbell, Wyant and Cannon Foundry Company is able to handle such staggering loads as 12,000 pounds.

It is interesting to note that the furnace is really a standard tempering furnace, and when the retort is removed, tempering operations can be carried on immediately. This flexibility factor has a decided appeal to heat treating plant operators. If, for example, present contracts call for nitrided work, and after the emergency is over the nitriding specification is omitted, the furnace can be put to use on tempering or other low temperature heating operations with the necessity of a single change in

SCHAUER
Speed Lathes

IDEAL for
POLISHING
LAPPING
FINISHING
of small parts.
"the originators
of today's
Speed Lathes"

SCHAUER MACHINE CO. 2060 Reading Road CINCINNATI, OHIO

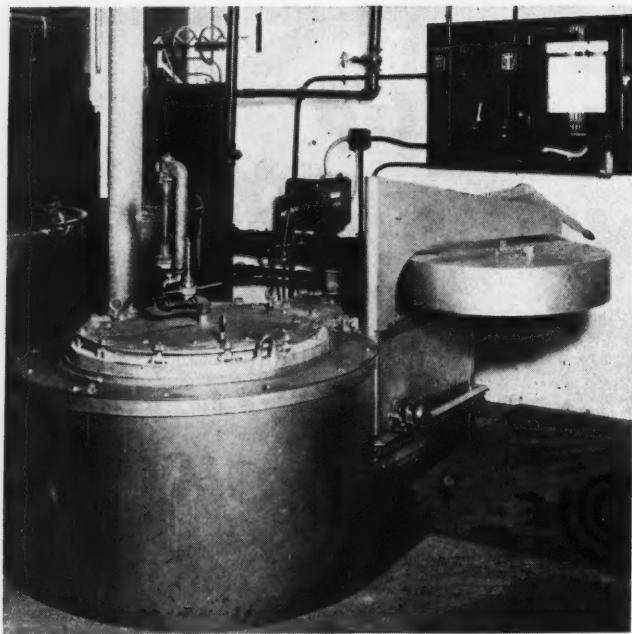


LET'S GO
INDUSTRY-
YOU CAN
LICK 'EM WITH
PRODUCTION

Production means *Electric Tools*—and industry naturally turns to Van Dorn to supply them. For behind Van Dorn stands 35 years of sound tool engineering . . . tools with an unequalled reputation for POWER, speed and stamina. With Van Dorn Tools on assembly lines, production men know they can lick drill-

ing, cutting, sanding, grinding and assembly problems! Your Van Dorn jobber is equipped to help you tool up, by demonstrating the correct Van Dorn Tools for specific jobs. Phone him at once—or write today for complete information: The Van Dorn Electric Tool Co., 720 Joppa Road, Towson, Md.

"Van Dorn"
(DIV. OF BLACK & DECKER MFG. CO.)
PORTABLE ELECTRIC TOOLS



"Cyclone" Nitriding Furnace with Chamber 28 Inches Diameter by 36 Inches Deep

the furnace except to pull the retort out by means of a hoist. This can be done in approximately five minutes.

Nitriding is carried on in two Lindberg Cyclone Nitriding Furnaces, each of which is equipped with an alloy retort 38 inches in diameter and 54 inches deep. Self-sealing inculated covers are provided and ammonia is introduced through pipes which extend through the cover. The furnaces are gas-fired and are of the forced convection type in which heated air is circulated under pressure and at high velocities. As the retort is heated by forced convection, there is no chance for radiation to affect temperature and uniformity.

The original installation consisted of a single furnace, the second being added later. In the period of approximately six months since installation more than 300,000 pins have been nitrided without the loss of a pin.

idle of the week and the next heat at the end. The weekly production, under this system, amounts to 20,000 pins.

Building 155 MM Gun Carriages

CARRIAGES for the 155 m.m. gun pictured above are being manufactured by Pettibone Mullikin Corp.

The BARNES Motor Driven Precision CUTTER GRINDING MACHINE

For Precision Grinding of Formed Milling Cutters used in the manufacture of rifles, pistols, etc.

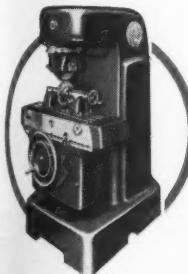
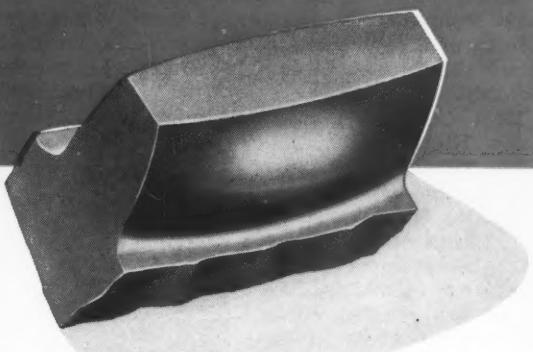
GENERAL MACHINERY CORP.
140 Federal St., Boston, Mass.
Telephone Liberty 4826



" Nitriding
with Cham-
pches Diam-
Inches Deep

THE ELLIPTOID TOOTH FORM

**Eliminates End Bearing—Solves Difficult
Aircraft, Military & Naval Gear Problems**



End bearing—load concentration of gear teeth at one end or the other—has always been a source of gear noise and early failure. In conventional gear practice it can be avoided only by extremely close tolerances—difficult and costly to maintain and which retard production rate.

Gear teeth given the Elliptoid Tooth Form on the Red Ring Rotary Gear Shaving Machine avoid end bearing. The Elliptoid tooth is thinner at the ends—thicker at the center or wherever it is desired to locate the bearing.

Machining this tooth is automatic—a patented optional part of the shaving operation—adds nothing to the very low cost of shaving.

With this method, smaller, less costly gears will stand up better under the same loading. For example, Elliptoid gear replaces conventional bull gear increasing service life 400%. When used in same aircraft gearing, service life was increased 200%—in truck transmission it provided an increase of 300% in service life. Similar records made in many other cases.

Write for descriptive bulletins.

**SPECIALISTS ON SPUR AND HELICAL
INVOLUTE GEAR PRACTICE**

**ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORMS**

**NATIONAL BROACH
AND MACHINE CO.**
RED RING PRODUCTS
5600 ST. JEAN-DETROIT, MICH.



155 MM Field Gun
(Approximately
6 In. Dia.)

Hobart Brothers, Troy, Ohio, are used extensively. Positioning has improved welds to such an extent that X-Ray testing is practically

eliminated — except, of course, where spot checks are made to insure against human element errors. Longer welds are tested with Magna-Flux method.

The finished carriage with the gun

of Chicago on a regular assembly line basis. Production is organized so that a force of 350 men can easily maintain a schedule of 40 complete units monthly.

Most steel used in carriage is Low Alloy Hi-Tensile, special steel being used only where necessary. Most of the steel is obtained already fabricated, the balance being flame cut to master templates. All joints are scarfed either 45 or 60 degrees in accordance with data from the Rock Island Arsenal, who were pioneers in construction of this type.

Tack welding and short seam welding is all done manually, using 13-18 carbon reversed polarity rods to give maximum ductility. Welding positioners, as shown in the picture above through courtesy of



Carriages for the 155 MM Field Gun are Assembled on a Production Basis, Using Welding Positioners Such as the One Illustrated Here

Field Gun
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Brothers,
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ON THE NEWEST MILLING
MACHINES, SPEED, AUTO-
MATIC CONTROL AND GREATER CAPACITY MEAN
PRODUCTION . . . AND THIS PRODUCTION IS GOV-
ERNED BY THE CUTTER AT THE WORKHEAD.

MORSE

THERE IS A
DIFFERENCE

**TWIST DRILL AND
MACHINE COMPANY**
NEW BEDFORD, MASS., U. S. A.

NEW YORK STORE: 130 LAFAYETTE ST. -- CHICAGO STORE: 570 WEST RANDOLPH ST.



Portable "Dynetric" Balancer In Use

new, sensitive metering element that eliminates the amplifier formerly needed, thus not only simplifying the apparatus but also reducing its weight by half.

The illustration shows one of the improved balancers at Westinghouse's East

mounted is subjected to a 1,000 mile road test, and preliminary results show an average of 33 miles per hour, with a top speed of 75 m.p.h. For firing, the rear wheels are removed and left and right trails are spread out so that the entire carriage is lowered to the ground.

Simplified Balancing Machine

THE latest version of the already widely-applied portable "dynetric" balancer is one that makes use of a

Pittsburgh Works, where it is used in analyzing vibrations of motors, generators, and other machines running at speeds as low as 100 r.p.m. Operating on the dynetric principle, the analyzer matches and compares electronically the voltage outputs of the sine-wave generator, on the right, which is driven by the machine under test, with the vibration-induced voltage generated in the improved magnetic pick-up held by the man at the left. The amount and location of any unbalance in the rotating unit is indicated on the meter of the improved analyzer.

THE WONDER CUTTER

Cuts wire or rod up to $\frac{1}{8}$ inch round ($\frac{1}{8}$ inch square) and band iron up to $\frac{1}{8}$ by 2 inches.

Adjustable stop for repeated cuts to same length. Hardened cutters last indefinitely.

Powerful leverage makes all cuts easy. Small size permits placing wherever convenient.



Small in size but a giant for work. The lowest priced rod and band cutter on the market. Every shop needs one. Hundreds in use.

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Write today for further details and price!

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PLANTS THAT MUST BE BUILT FAST CAN BE BUILT FASTER with SKILSAW TOOLS!

NEW plants, enlarged plants, remodeled plants—they're needed **FAST** for America's victory . . . they're finished **FASTER** when SKILSAW TOOLS are on the job, speeding up building each hour of each day. Are skilled hands scarce? Is time too short? SKILSAWS cut days from schedules . . . SKILSAW DRILLS punch holes in bottlenecks! Do you want proof? 9 out of 10 defense contractors use SKILSAW TOOLS! Ask your distributor for a demonstration.

SKILSAW trims roof sheathing faster . . . after it is nailed in place to save extra time.

SKILSAW quickly cuts plywood panels . . . speeds up concrete form work . . . makes pocket cuts swiftly.

SKILSAW DRILL speeds up timber boring. Powerful, yet compact for drilling in close quarters.

SKILSAWS speed up all sawing in maintenance, remodeling and construction. Cut out old flooring . . . make pocket cuts in walls and floors for service pipes and ducts. Size and trim all lumber . . . cross-cut, bevel-cut, rip and groove. 9 Powerful Models.

SKILSAW DRILLS are as fast on maintenance and remodeling work as they are on production! Do all drilling from lightest lead holes for hardware and fixtures to heaviest boring in construction. Swiftly drill holes for all conduit and pipes. 22 Powerful Models.

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SKILSAW **PORTABLE ELECTRIC TOOLS**
★ FOR THE DEFENSE OF AMERICA ★

Reducing Shaper Accidents

By ERNEST W. FAIR

ACCIDENTS don't happen; they are caused. Accidents that occur in connection with the operation of machine tools, however, can to a large extent be prevented by consideration of the peculiarities of the individual machine and the observance of certain rules designed to apply to that machine.

The accidents that occur most frequently are those that are caused by tools which become loose in the toolposts, due usually to carelessness on the part of the operator. The operator should always make certain that the tool is properly clamped in the toolpost before starting the machine.

Accidents occasionally occur due to lack of oil. Machine bearings should never be allowed to run dry; each and every machine tool should be oiled before starting.

Accidents may be caused by failure to take into account such things as projections on the work, or projecting bolts or brackets, especially when adjusting the table vertically. Such accidents can be eliminated by leaving the ram projecting over the table so that the operator may know

when the table is high enough.

Many accidents are caused by failure to clamp the work properly. Nuts should be tightened down on all bolts and should be checked for tightness frequently.

Failure to locate the stops or dogs properly is a frequent cause of shaper accidents. Where heavy work is to be clamped, stops should be rigidly bolted to the table to prevent the work from sliding.

The back gear should never be changed while the machine is in operation; teeth will surely be broken out of the gears and the entire operating mechanism may be badly damaged. The machine should always be stopped before the backgear is thrown in or out.

Of the personal injuries to operators, the most frequent is caused by getting a finger caught between the tool and the work. It is never advisable to reach across the machine table or otherwise place the hand or arm in such a position that the tool can strike it while the machine is running. The machine may be quicker than the operator.

Last, but not least, are the accidents that are caused by flying chips. No one should ever operate a shaper without wearing goggles to protect

Janette Rotary Converters and Dynamotors. An eight-page bulletin containing tabular, descriptive, and illustrated on Janette Rotary Converters for use with sound apparatus, testing equipment, fluorescent lights, and so on, and Janette Dynamotors for converting direct current from one voltage to another has been issued by the Janette Mfg. Co., 556-558 W. Monroe St., Chicago, Ill. Copy of Bulletin 13-25 free upon request.

Mikrokator, an instrument designed for "Mikro" (minute) measurements

and which is said to employ a new, revolutionary principle of frictionless amplification, is covered in detail in an eight-page illustrated and descriptive catalog prepared by the Swedish Gage Co. of America, 7310 Woodward Ave., Detroit, Mich. Copy of Catalog No. 40 free upon request.

Swedish Internal Indicators for rapid, convenient, and accurate measurement of internal diameters are described and illustrated in an eight-page bulletin released by the Swedish Gage Co. of America, 7310 Woodward Ave., Detroit, Mich. Copy free upon request.

IDEAS FROM READERS

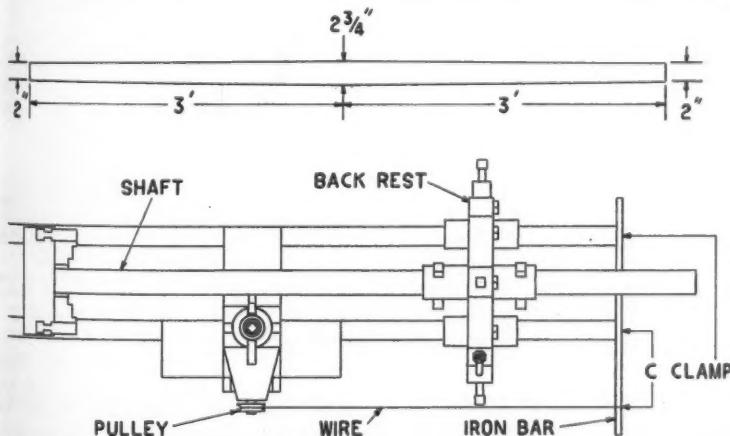
Turning a Taper on a Long Connecting Rod

By WILLIAM H. BIGGS

CONFRONTED with the task of turning a taper on each end of a connecting rod that was longer than the lathe in which the job was to be done, the apparatus indicated in the plan drawing herewith was rigged up. The shaft was too long to swing between centers, so the tailstock was removed. Inasmuch as the taper extended from the middle each way to the ends, however, it was possible to set up a back rest to provide support for the free end of the rod. The opposite end was chucked.

The shaft was six feet long, which meant that each tapered portion was to be three feet long. The taper was $\frac{1}{4}$ inch to the foot. With no tailstock and no taper attachment, it was necessary to find some means of feeding the tool crosswise $\frac{1}{8}$ inch in the three feet of longitudinal travel.

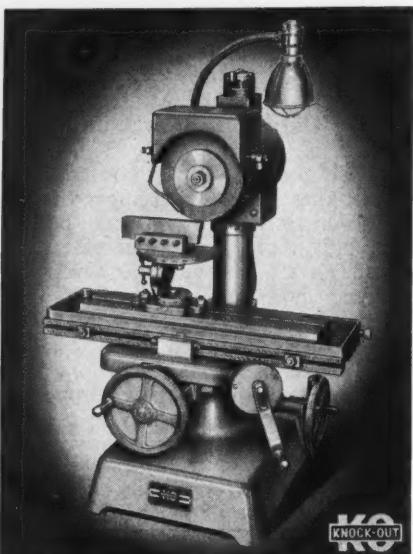
First the handle was removed from the feedscrew, then a flange pulley was made, 3.820 inches diameter, and placed on the end of the screw in place of the handle. Then the end of a piece of piano wire was fastened to the face of the pulley and after being wound a couple of times around the pulley was clamped at the opposite end to an iron bar which had been anchored securely across the ways at



Drawing Illustrating Method Used to Turn a Taper on a Rod that was Longer than the Lathe

the tail end of the lathe.

Having an 8-pitch crossfeed screw, it is obvious that when the tool had fed one foot in a longitudinal direction toward the headstock, the pulley would have made one complete revolution, feeding the tool crosswise $\frac{1}{8}$ inch. Thus in three feet the tool would be fed crosswise $\frac{3}{8}$ inch, which would produce the necessary taper of $\frac{3}{4}$ inch in three feet.



The Model A603 Chip Breaker Grinder is another Knock-Out to add to a long line of fine machine tools. Its 11-inch longitudinal table movement makes it ideal for manufacturing operations. The addition of a tilting table attachment makes it capable of complete maintenance of carbide-tipped tools. Write for PL41-2M and List of Users.

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Aberdeen, South Dakota, U. S. A.

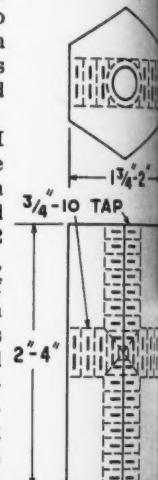
Adjustable Heel for Clamp Discussion

By EDWARD E. FELTER

IN the November, 1941, issue of MODERN MACHINE SHOP read C. F. Fitz's article describing an "adjustable heel for clamp." Often these clamps are pack-hardened to resist wear, in which case it takes time to anneal and drill them.

For a clamp I use two or three pieces of 2-inch hex cold rolled steel about 2 inches long, through each of which a $\frac{3}{4}$ -inch 10-thread hole has been drilled and tapped. With a $\frac{3}{4}$ -inch bolt of suitable length, or bolt and stud, you have a perfect adjustable heel; one which can also be used as a light-duty jack for use on planer, mill, or other machine.

The heel can be adapted for use in a low position by drilling and tapping a hole crosswise through the center, as shown.



Drawing of Adjustable Heel for Clamp with Clamp

S.A.E. Standard Bolt Chart

By DAVID FIEGELMAN

EVERY now and then our shop has occasion to use a S.A.E. Standard bolt, in which case we usually find that we have to refer to a handbook for detail specifications. There are plenty of charts available giving specifications for U. S. S. Standard

A COMPLETE SYSTEM OF METAL SAWING

The MARVEL System of Metal Sawing provides exactly suited saws for every shop or department. Included in the System are: Low priced dry-cutting general purpose shop saws; a light duty high speed shop saw; heavy duty, all-ball-bearing speed saws (the fastest saws built); heavy duty production saws with automatic bar push-up; versatile all-purpose metal cutting band saws of large capacity; a new giant hydraulic hack saw designed for the largest sizes and toughest alloys . . . and the positively unbreakable MARVEL High-Speed-Edge Hack Saw Blades.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U. S. A.
Eastern Sales: 225 Lafayette St., New York City



In almost every leading tool manufacturing plant, as in the Chicago plant illustrated here, they have standardized on MARVEL Metal Sawing Equipment. (Above: MARVEL No. 8 Metal Cutting Band Saws. Below, a battery of MARVEL No. 6A High Speed Production Saws.)

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5700 Bloomingdale Ave., Chicago, U. S. A. Eastern Sales: 225 Lafayette St., N. Y.

Clamp-

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SHOP
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HOME
13" 2"
TAP

Heavy Duty
High Speed
Cap. 6" x 6"

Heavy Duty
High Speed
Cap. 10" x 10"

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Chart

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Standard

February, 1942

S.A.E. STANDARD THREADS, BOLTS AND NUTS

DIA.	NO. OF THDS. PER INCH	ROOT DIA. OF THREAD	DIA. OF TAP DRILL	DIMENSIONS OF NUTS AND BOLT HEADS			
							
1/4	28	0.204	*3	7/16	0.488	7/32	3/16
5/16	24	0.258	*1	1/2	0.557	17/64	15/64
3/8	24	0.321	*Q	9/16	0.628	21/64	9/32
7/16	20	0.373	*W	5/8	0.698	3/8	21/64
1/2	20	0.435	7/16	3/4	0.840	7/16	3/8
9/16	18	0.490	1/2	7/8	0.982	31/64	27/64
5/8	18	0.553	9/16	15/16	1.051	35/64	15/32
3/4	16	0.669	43/64	1/16	1.191	21/32	9/16
7/8	14	0.782	25/32	1 1/4	1.403	49/64	21/32
1	14	0.907	29/32	1 7/16	1.615	7/8	3/4
1 1/8	12	1.017	1 1/64	1 5/8	1.826	63/64	27/32
1 1/4	12	1.142	1 9/64	1 13/16	2.038	1 3/32	15/16

bolts and nuts, but we were unable to find a similar chart for SAE bolts.

We went to the trouble of making up a chart for SAE bolts and as we find it very useful in our own shop, others may find it equally useful.

Sub-Socket for Lathe Tailstock Spindle

By WM. HALLIDAY, England

MANY good mechanics hold that it is bad practice to use the center hole in the tailstock spindle to hold taper shank drills, reamers, boring bars, and similar tools, due to the fact that the tool so employed may loosen and be revolved and thus score the surface in the hole. The result is

end to permit boring out so that it will fit over the tailstock spindle, and smaller at the other end, though large enough to provide for boring taper as shown, to take a taper shank tool. The large end was bored to a snug fit on the spindle **B**, and drilled and tapped for the screw **F**. An elongated slot, **C** was provided at the end of the tapered hole to permit the use of a drift.

The tailstock spindle was removed temporarily to have the small keyway **E** milled in, the keyway being carried for a distance of about 1 1/4 inches from the end. The hole in the socket was then keywayed to match the keyway in the spindle and a key tightly fitted in. Thus means was provided for attaching the socket to the spindle quickly when necessary, providing the advantages of a spindle

Chart of Speci-
fications for SAE Standard Bolts and Nuts

that the work and scored spindle hole will fail to provide an accurate seat in the center, and may cause inaccurate work.

The writer overcame the difficulty by designing a simple sub-socket to hold the tools in the tailstock center hole, the socket being shown in the drawing.

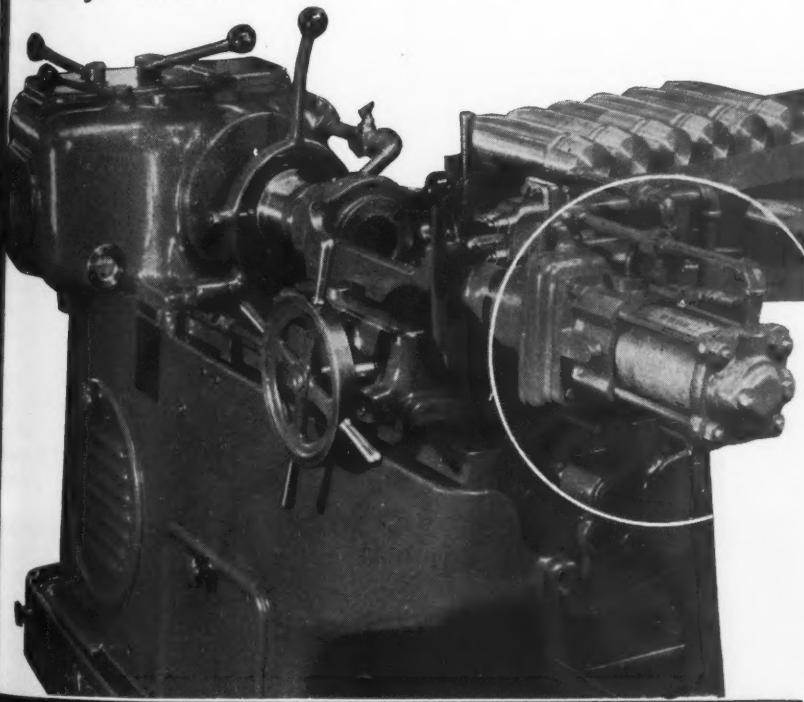
The socket is made of steel turned to a large diameter at one

of Specific
or SAE Stan-
dards and Num-
bers

Another Problem Solved with Hanna Cylinders

PUT THEM TO WORK for You!

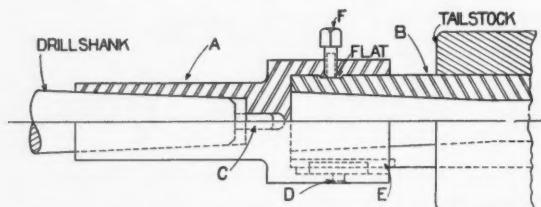
Producing shells—fast and many—is a vital task today. We're doing it with machines like these. The important job of clamping the shells for tapping is done with a Hanna Air Cylinder—the simple, positive and efficient way. Here is another example of the 1001 uses for Hanna Cylinders in pushing, pulling, lifting or holding. What can you use them for?—In your plant or on your machine? Write for catalogue No. 230.



HANNA ENGINEERING WORKS
1765 ELSTON AVENUE • CHICAGO, ILLINOIS
RIVETERS • CYLINDERS • AIR HOISTS

sleeve with no risk to the accuracy of the center hole.

The tool described above was found



Drawing Illustrating Design of Sub-Socket for Use in Engine Lathe Tailstock Spindle

so useful that a number of sockets of different sizes have now been supplied to the turning department for regular service. The small initial outlay is quickly repaid in longer spindle life, the maintenance of accuracy, and increased efficiency from small tools.

A Quick Job of Lathe Half-Nut Reconditioning

By J. E. MOORE

RECENTLY we have been running both day and night school in the machine shop in the vocational schools in our city, keeping busy the eight engine lathes which comprise part of the equipment in the machine shop. One night the half nuts refused to operate on one of the lathes,

and we found the threads so worn that the halves were almost smooth. An examination showed the other seven lathes were in almost as good condition.

We shut these lathes down for repairs on a day night, and on Monday morning the lathes were ready to use again.

We took one set of half nuts and the lead nuts off from one lathe

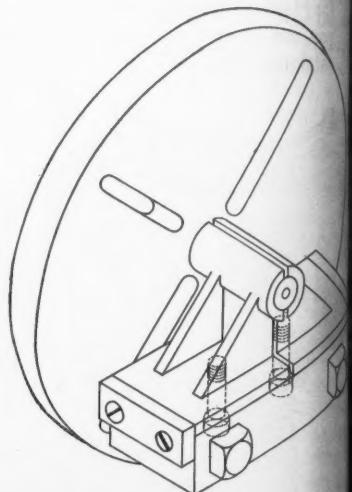


Fig. 1—Half Nuts and Leadscrew in Fixture for Centering the Fixture

COMET Internal Threading and Boring Tool

For holes from $\frac{1}{8}$ " upwards 15 Different Sets. The accurate thread angle is maintained through sharpening until tool is entirely worn down—head—long cutting surface for regrinding.

Write for complete details

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Bethlehem
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*Drilling barrels of machine guns.
In operations like this, MO-MAX
has demonstrated its superiority.*

**MORE TUNGSTEN
is unnecessary
LESS TUNGSTEN
is not enough
MO-MAX**

MOLYBDENUM-TUNGSTEN HIGH SPEED STEEL

—the original Moly high-speed steel, with less than two per cent of Tungsten, has demonstrated its superior cutting quality throughout more than nine years of widely varied service. It offers also the unique advantage of availability from fourteen independent producers listed below.

FORMULA FOR GENERAL PURPOSE

MO-MAX

Carbon.....	.80
Molybdenum.....	8.50
TUNGSTEN.....	1.50
Chromium.....	4.00
Vanadium.....	1.00

For detailed information ask your usual source of supply or write The Cleveland Twist Drill Co., Cleveland, Ohio.

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Alleghany Ludlum
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Columbia Tool Steel
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Steel Co.

Bethlehem HM

Bethlehem Steel
Company

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Sons, Inc.

Mo-Tung

Universal-Cyclops
Steel Corp.

Mo-Cut

Braeburn Alloy
Steel Corp.

Rex-T-Mo
Halcomb Steel Co.

Vul-Mo

Vulcan Crucible
Steel Co.

Star Max

Carpenter Steel Co.

Mesul

2896

then set the half nuts up on a lathe faceplate as shown in Fig. 1. The leadscrew was projected through the

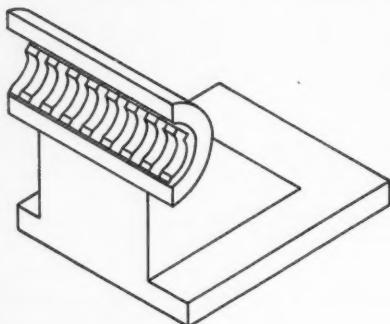


Fig. 2—The Threads were Completely Removed and New Bronze Brazed In

headstock spindle and clamped tightly between the half nuts. The center hole in the end of the leadscrew was used to center the holding jig on the faceplate. Once having the work

properly centered, the jig was bolted firmly to the faceplate. This jig was used to hold all of the eight sets of half nuts, in turn, while they were threaded.

The next move was to remove the half nuts from the faceplate jig, after which a round file was used to remove all of the old threads, including about $1/32$ inch of extra stock. Then we had the welders braze bronze into the individual halves, as shown in Fig. 2. Another jig was made to hold these halves exactly $\frac{1}{8}$ inch apart, on the deduction that a $\frac{1}{8}$ -inch saw had been used to saw the halves apart at the factory. The two halves were then held straight and true in the jig while the welders brazed them.

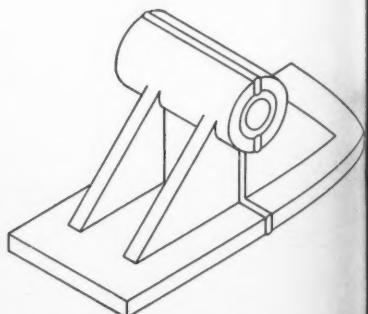


Fig. 3—The $\frac{1}{8}$ -Inch Clearance Between the Halves was Filled with Bronze, Then the Halves were Sawed Apart after Threading

REED Standard Stock KNURLS

150
SIZES AND STYLES
IN STOCK

Cut precious minutes of production time by retooling with Reed STANDARD STOCK Knurls.

Write for Catalogue No. 61-1141

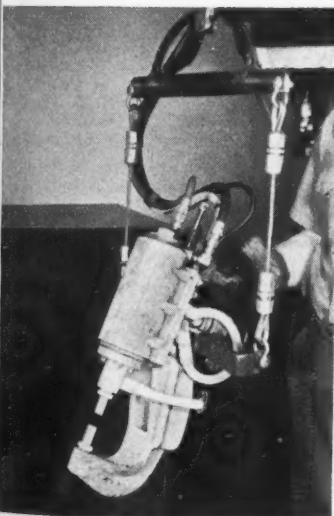
REED SMALL TOOL WORKS
WORCESTER, MASSACHUSETTS

$\frac{1}{8}$ -inch opening with bronze. The result is shown in Fig. 3.

The brazed nuts were now clamped in the faceplate jig and bored out and threaded to fit the lead screws. A $\frac{1}{8}$ -inch slitting saw was used to cut the halves apart and they were then assembled to their own lathes. The zero settings on the threading dial were corrected, and the lathes were ready for use again. The job was not only satisfactory, but was done with a minimum of down-time and at a minimum of expense.

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News . . . A welding gun for aluminum. For production and tack-welding. Refrigerated, as shown, if desired, to minimize tip cleaning and mushrooming. Gun holder permits welding in virtually any position.

... unless you first get them into the air. To speed airplane production, Progressive—largest producer of welding guns—has developed a portable welding gun designed specifically for the welding of aluminum.

Developed at the request of aircraft manufacturers, the gun will permit welding of parts too large to handle in pedestal welders, as well as quick tack-assembling of small parts, etc., in fixtures.

Designed for operation through virtually any control equipment used for aluminum welding, the gun is available on quick delivery in different yoke types to meet individual requirements, as the result of incorporating all operating mechanisms in an interchangeable gun head.

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Over the Editor's Desk

Substitutes

WAR is certainly no blessing, even in disguise, but the present war may give us a lesson in developing our internal resources and substitutes for essentials that are unavailable. For instance, as a result of the copper shortage it is expected that steel will replace brass in shell casings. It has been found that some of the former disadvantages of steel can be overcome by plating the steel thinly with copper, which protects the steel from rust and from damage by powder fumes. Steel is harder to machine, but, on the other hand, copper-plated steel shell casings can be re-used 15 times whereas the brass casings are good for only four firings.

Approximately 90 per cent of our rubber comes from the East Indies, and this supply is now cut off due to the war.

The production of synthetic rubber has been successful, but production costs have been too high to enable successful competition with the native product. The production of synthetic rubber has been about 12,500 tons a year. To meet the needs of the immediate future, when present rubber stocks shall have been exhausted, four plants for the production of synthetic rubber are now in process of construction and are expected to turn out 40,000 tons of product. By building additional plants, we may be able to produce 120,000 tons per year by the end of 1942. Never again will America be so dependent upon a far distant source for its rubber.

One of the greatest aids to metal manufacturing is tungsten—the material upon which the development of "carbide" tools was originally based. The greater part of our supply of tungsten has come from China via the Burma Road, and now the

supply may be cut off entirely until American forces dominate the Pacific again. Of the 25,000 tons needed annually, the domestic mines can produce about 8,000 tons. About 4,000 tons can be obtained from Bolivia. In place of the remainder we will have to use a substitute—probably molybdenum.

Fortunately, we have an ample supply of molybdenum. The Climax Molybdenum Company's huge mine in Colorado is now producing molybdenum at a rate of 32,000,000 pounds a year and will be producing 5,000,000 pounds more by May of this year. In addition to its use in high speed cutting tools, molybdenum steels are going into armor plate, gun barrels, truck, plane, and tank parts and so on.

Welding as a method of fabrication in ocean vessels has come into its own as a result of war necessity. For more than 15 years the science of welding has been in process of expansion to cut costs and—in many cases—improve quality in the fabrication of a wide variety of small and medium size products, but it has met with strong opposition for the construction of buildings, ships, and other products in which strength is important. Under the pressure of war needs this opposition has been swept aside and welding is proving its worth.

War IS Hell, beyond doubt, but even war may be productive of some good. Our nation is still "the melting pot." Our people are still but a few years from the lands of their origins. But upon the arrival of war the American people will be forged into a unified nation, hardened to meet the necessities imposed by aggression from without, and tempered to return with swift vengeance any blow to the pillars of freedom and liberty upon which this nation is founded.

**Coining 42,000 contact rivets
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This is performance three times better than the steel formerly used. In coining, the crowned silver contact face of rivet is flattened .017", and a radius formed at junction of head and shank.

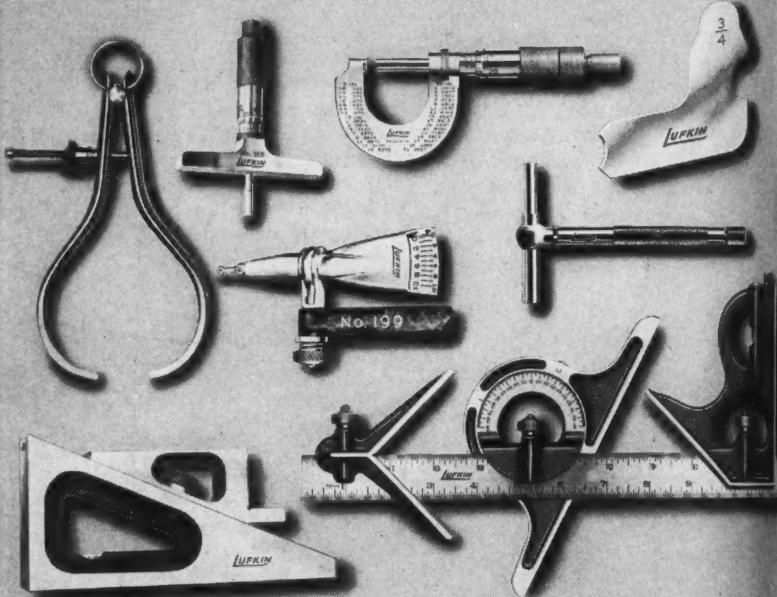


TOPS IN TOOL STEELS

Vanadium-Alloys

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LUFKIN TOOLS FOR FINE WORKMANSHIP



There's something about Lufkin Precision Tools that appeals to mechanics who take real pride in their work. Perhaps it has its roots in the downright good workmanship that's put into them in the first place. At any rate—it isn't hard to find—and your dealer will be glad to show you.

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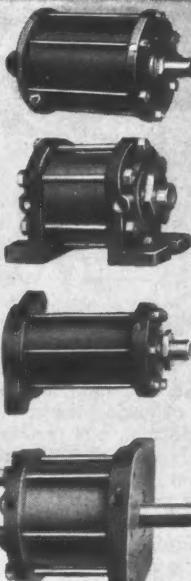
Canadian Factor
WINDSOR, ONT.

TAPES — RULES — PRECISION TOOLS

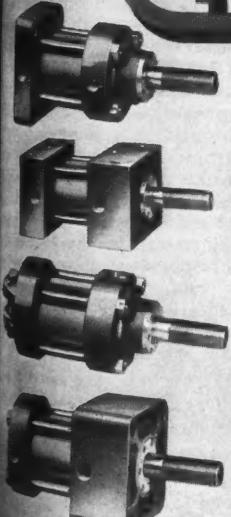
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Furnishes "air squeeze" action combined with automatic feed riveting for aircraft production.

By using a different type of rivet set and jaw construction, Counter Sunk Head Rivets are handled as well as Flat Head, Round Head, Full and Semi-Brazier Head Rivets. For specifications, etc., write Dept. M.



Air Cylinders



Hydraulic Cylinders

EQUIPMENT

HELPS ATTAIN MAXIMUM
SPEED IN PRODUCTION

T-J AIR CYLINDERS

These units exert power movement from 100 lbs. to 12,000 lbs. (direct). Made in styles, sizes and strokes to meet your requirements.

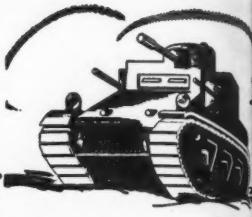
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THE TOMKINS-JOHNSON CO.

Jackson . . . Michigan



Tools For National Defense

Mahr Continuous Pusher Type Roller Rail Furnace

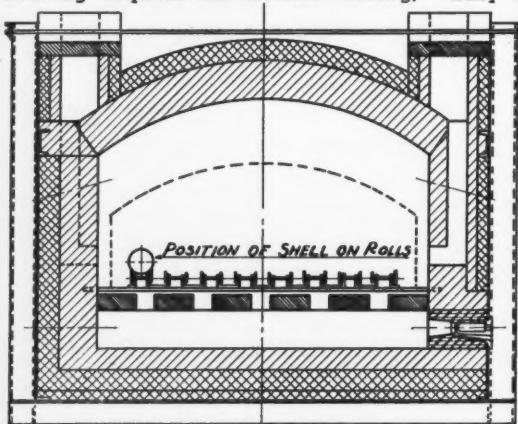
The demand for speed in the production of projectiles in the sizes from 75 up to 155 mm. has resulted in the design of much special equipment for producing larger and larger quantities per work hour per unit in the heat-treating of such shells. One of the most efficient pieces of equipment for making the heat-treating process entirely automatic is the Mahr Roller Rail Hearth Furnace, which is equipped with a timed pusher to advance shells through the furnace, the pusher being synchronized with an automatic quench system and conveyor type draw furnace. Using this system, the process of hardening, quenching, and drawing requires no manual loading,

handling, or guiding of shells except at the charging end of the furnace.

Built by the Mahr Mfg. Co., Division Diamond Iron Works, Inc., Minneapolis, Minn., roller rail hearth furnaces are designed to handle anywhere from two to 12 rows of shells per furnace. Each row of shells rides on a separate set of rail and carriers which is designed to convey the shells through the furnace with a minimum of friction. The rails and rollers of the rail are cast of high temperature alloy. Due to the fact that they are built into the furnace, the rails and rollers are always at the same furnace temperature, eliminating a per hour possibility of cold spots on the charge.

The operation of the continuous rail hearth heat-treating system is simple and positive. The shells are loaded manually onto the charge rollers in front of the shell pusher shoe. The operation of each of the pusher is controlled by a time clock which has been set to make contact at the proper time, the time being fixed by the heating cycle. When contact is made in the clock, the motor-operated door starts to rise and, when open enough, trips a switch which energizes the motor driving the pusher mechanism.

The pusher ram moves forward and forces the shells which have been placed on the charge rollers, into the furnace. Shells in the furnace are nose to end and at each push are advanced one length further in the furnace. At the same time that shells are being charged the same number of shells are



Cross Section View of Mahr Continuous Pusher Type Roller Rail Furnace for Hardening, Quenching and Drawing 75 to 150 MM Shells, Showing Position of Shells on Rolls

being discharged through specially designed chutes into the quench.

For high explosive and other open nose shells made with the thickest section at the butt, the thick section enters the quench first. As the shell enters the quench oil, it is stopped momentarily under the surface and jets of oil under high pressure are forced into the cavity to assure a thorough quench inside and out. These jets of oil are said to eliminate the possibility of air or gas pockets forming in the cavity and preventing complete quenching.

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Movement

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size of the shells usually determining the length

of each furnace in the system. The heating

cycle and quantity of production can

be varied by changing the timing.

The complete system is timed to pro-

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the shells usually determining the length

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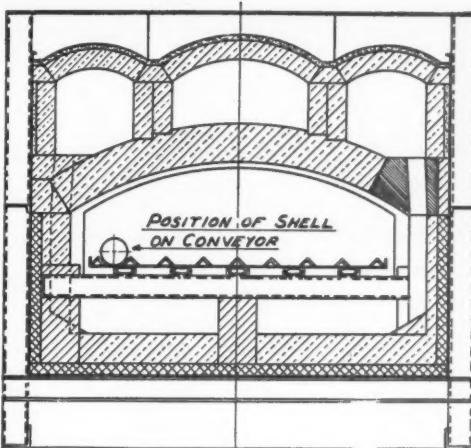
The roller rail hearth of the hardening

furnace permits complete circulation of

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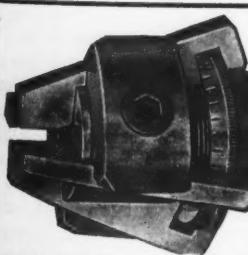
contact with cold furnace parts.



Cross Section View of Draw Furnace, Showing Position of Shells on Conveyor

The hardening furnace is direct-fired by burners firing from both sides, over and under the charge. The draw furnace is heated by convection, an exterior heater producing the heat, which is forced to all parts of the furnace by an alloy heat fan. Heated gases are circulated through the furnace and drawn off for reheating and recirculation.

The armor piercing shell furnace construction and mechanism are the same as those of the complete furnace just described with two exceptions. One is the timing, which must be fixed to give a longer heating cycle in both hardening and drawing. The other is in the discharge of the shells from the hardening furnace to quench, the chutes being designed to drop the projectiles into the oil



KUTMORE HIGH SPEED ADJUSTABLE HOLLOW MILLS

16 standard sizes—Cutting capacities $1/32"$ to $2"$. Also specials made to order.

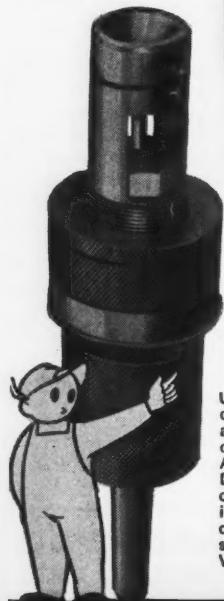
The KUTMORE is the only hollow mill with built-in micrometer dial adjustment. Prompt delivery—even on specials. Write for Catalog No. 15.

CARL WIRTH & SON, 1625 Clinton Ave., N.

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UNIVERSAL CENTERING CHUCKS AND FLOATING CHUCKS FOR SPEED, ACCURACY

Universal floating chucks (right) are designed to operate horizontally in automatic screw machines and turret lathes. Adjustable spring pressure in 4 directions prevents dogtail motion and marred holes.



Universal centering chucks (left) make a centering machine out of a drill press. Accurate and sturdy. Depth adjustment for centers. Both floating and centering chucks available for speedy delivery. Write for catalog.



UNIVERSAL

Engineering Company
Frankenmuth, Mich.

nose down and in a vertical position. The nose is flooded with oil from sprays while in this position, and the shells are then deposited onto the conveyor.

Heating-treating systems of this type are built to produce hardened, quenched and drawn shells of 75, 90, 105, and 130 mm. in quantities of 40 to 200 per hour continuously.

Hough Blackout Shade

To provide industry with a means for blacking out large areas of glass in factories, and so on, yet, which will permit the use of natural daylight for factory lighting as well as window ventilation for proper working air, the Hough Shade Corp., Janesville, Wis., is now offering a blackout shade which is designed so that it can be rolled up to permit the entrance of natural daylight. The shade, which has been treated with a fire-resistant material, is also designed to protect workers from sun glare and heat as well as delicate machinery and products from flying glass and fragments.

War Work to Automotive Plants

According to William H. Harrison, Director of the Production Division of the OPM, the war program will require that the automotive industry turn out five billion (\$5,000,000,000) dollars to six billion (\$6,000,000,000) dollars worth of war work this year. To meet this schedule, the government's program calls for (1) cessation of all non-military passenger car and light truck production around January 31st, (2) immediate creation of a management-labor sub-committee on conversion to work with the OPM, (3) advancement of production schedules for about \$4,500,000,000 of Army and Navy orders already held by the automotive industry, and (4) placing of \$5,000,000 of additional war orders in the industry under new procedure designed to speed up initial production. This addition would boost the total to approximately \$9,500,000,000.

Stating that the best possible use of

Defense Production Demands

- GREATER ACCURACY
- CLOSER LIMITS
- INTERCHANGEABILITY With Parts Produced Elsewhere



Fig. 2



Fig. 3



Fig. 4



Fig. 1

HOW ARE YOU PREPARED TO MEET THIS CHALLENGE?

Your present equipment, adequate under normal conditions, must be augmented by modern tools and instruments which do not depend on the operator's skill and measuring feel. The best investment you can make to guard against rejections, disputes, loss of time and materials is in inspection equipment.

Fig. 1—ULTRA-CHEX Inspectoset consists of 34 gage blocks giving you 80,000 combinations in steps of $1/10000$ ".

Fig. 2—The SCHERR COMPARITOL used to check plug gages, pins, bearings, aircraft parts, ammunition components to an accuracy of $.0001$ " and $.00005$ ".

Fig. 3—The WILDER PROJECTOR for measuring or comparing screw threads, gears, templates, punchings and other objects by means of a magnified shadow image. Speeds up inspection.

Fig. 4—TOOLMAKER MICROSCOPE for precision checking of thread gages, ground taps, angles in degrees and minutes, linear dimensions, templates, cutters, hobs, forming tools. Will check the most complicated job in minutes instead of hours required by old methods.

Write today for literature, prices and delivery dates.
We also furnish Reed Micrometers—GS Tool Chests—GS Dial Indicators—Radius Dressers—Surface Plates—Angle Irons—Snap Gages—Ultra-Chex Gage Blocks. Ask for folders on above.

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February, 1942

manpower is necessary to achieve the goal set, Mr. Harrison suggested the following: (1) Pooling of machine and tool facilities, (2) Interchange between companies of dies, patterns, and processes, (3) Concentration of difficult and complex jobs (aircraft, tanks, guns, etc.) in large plants and elimination of simpler jobs from these plants in order to make the most effective use of highest managerial skill and technique, (4) Subcontracting to the maximum extent, with each auto manufacturer farming out work insofar as possible to its regular suppliers and others who have manpower and machinery, (5) concentration of necessary civilian production in smaller plants not readily suitable for war production.

Speaking before a recent conference, Sidney Hillman, Associate Director General of the OPM, said, "We cannot afford to have a single machine idle. An idle tool in one of our plants is working for Hitler."

Thor Portable Electric Tool Catalog No. 37. The complete 1942 line of Thor Portable Electric Tools is described in an attractive 64-page catalog now being issued by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago Ill. Containing four major sections, the catalog, which is designated as the No. 37, gives complete descriptions, specifications, and prices on the entire Thor line of universal type electric drill, drill stands, screw drivers, nut setters, tappers, saws, hammers, nibblers, grinders, sanders, polishers, and electric tool accessories.

Printed in two colors and profusely illustrated with photographs of tools in operation on various types of work, the catalog is a helpful guide to the selection of proper equipment for different applications. It contains much pertinent information regarding the uses and construction of Thor tools.

Featured in the catalog are the Thor $\frac{1}{4}$ and $\frac{1}{2}$ -inch capacity drills, the original small and light tools for fast drilling. In addition, the new "Thor-Nado" Electric Hammer and the Thor Nibbler for cutting metal are catalogued prominently. Copy of Thor Catalog No. 37 is free to industrial executives, production men, and engineers upon request.

THE CENTER OF ATTRACTION

Economical Live Ball and Roller Bearing Centers are going to play an important part in our defense program.

For LATHES, HAND SCREW MACHINES, GRINDERS and MILLS.



The features that interest you most:

1. Simplicity, sturdiness, and heavy duty.
2. 50% more radial load carrying capacity than the average live center.
3. Large spindle, small head, short overhang most desirable for rigidity and to be free from chatter.

4. With aid of cap screw you can lock spindle to redress point right in your machine.
5. Special oil seal to retain lubricant and keep out foreign matter.
6. A compression pad to compensate for heating and expansion of metal as a safety factor, with reasonable diligence exercised.

A folder giving prices and complete details will be mailed to you upon request.

A ten-day trial. If not perfectly satisfied, your money will be cheerfully refunded.

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AN AMAZING NEW GRINDING WHEEL DOES 2 TO 5 TIMES MORE WORK PER MAN PER MACHINE

Are you pushing your grinding machines to the limit? . . . are you short on help? Then here's real news for you . . . a new type of grinding wheel, called Por-os-way, made by a new, patented process.

FASTER, COOLER, FREE CUTTING. Unlike ordinary grinding wheels the structure of the Por-os-way wheel is honey-combed with millions of large air cells which surround and cool each tiny grinding point between contacts. Wheel and the work stay cool, so cool that even un-

skilled operators rarely burn work. It takes deep cuts easily—breezing through .010" or more. The Por-os-way wheel is amazingly free cutting as you'll see when you try it on copper, aluminum, wood, plastics, rubber, or other soft materials.

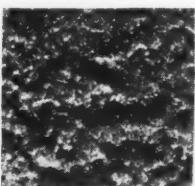
NEW VITRIFIED BOND. To achieve the porosity-plus-coherence of the Por-os-way wheel required the use of a tough, new vitrified bond. Por-os-way wheels hold their corner, require minimum dressing.

DEEPER CUTS, FASTER FEEDS. The depth of cuts possible with Por-os-way wheel has astonished skilled mechanics. Former cuts have been doubled, trebled, regular cuts taken at faster feeds.

"PRESCRIPTION" FITTED. Por-os-way wheels are not stock wheels. They are made to order for your conditions of grinding. Write for a demonstration today. Let us prove to you that it is faster, cooler and free cutting on your job.



Usual wheel, magnified. Note the compact, "andy" appearance.



Por-os-way structure, cellular, "stringy" like a sponge, but tough.

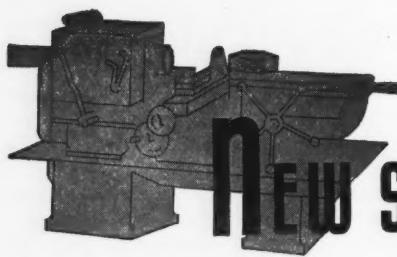
POR-OS-WAY
a new
RADIAC PRODUCT

A. J. DESANNO & SON, Inc., Phoenixville, Pennsylvania

ASK FOR A
DEMONSTRATION



February, 1942



Gleason No. 17 Hypoid Grinder

Designated as the Gleason No. 17 Hypoid Grinder, a machine for use in finishing the teeth of generated curved-tooth, bevel, and hypoid gears and pinions has been announced by the Gleason Works, 1000 University Ave., Rochester, N. Y. In the grinding of bevel gears, heat-treat distortion is said to be corrected, all teeth are said to be made uniform, surface irregularities are eliminated, tool marks are removed, and tooth profile and fillet are blended smoothly into bottom land. As a result, smooth and quiet operating gears with long life are obtained.

The generating motion employed in the operation of the grinder combines continuous rotation of the work spindle with a reciprocating motion of the wheel-carrying cradle.

The dressers for the cup-type grind-

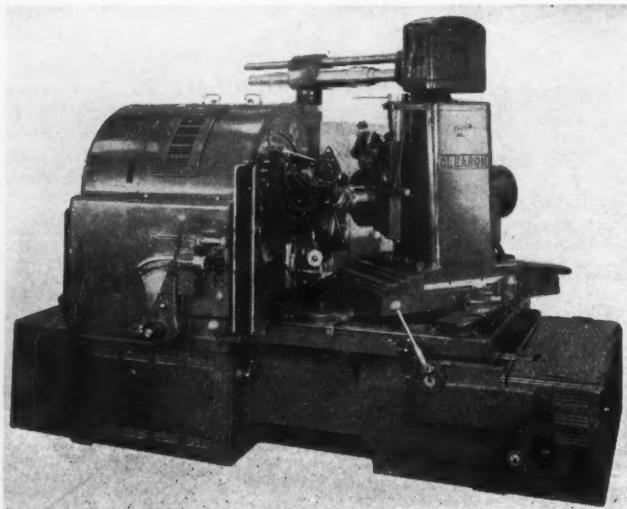
ing wheel are hydraulically operated. After operating the control lever, dressing is entirely automatic, including advance of the wheel, and side, end, and radius dressing. The dressers are completely adjustable for feed, pressure angle, radius, and wheel diameter.

In grinding a gear, the wheel is alternately fed to the work during the up-roll of the cradle and withdrawn during the down-roll of the cradle. The work in the meantime, rotates continuously so that the wheel, when starting on the next up-roll, engages a following tooth. This cycle is repeated until all teeth are ground, at which time the machine automatically stops. Hydraulic movement of the sliding base to and from cutting position and a new type hydraulic chuck provide speed and ease in changing work.

Control of tooth bearing is obtained by dressing the wheel to a modified shape and by modifying the generating roll. Change gears control indexing from tooth to tooth and wheel speed, while cams control the generating roll and the feed.

Specifications of the Gleason No. 17 Hypoid Grinder are as follows: cone distance, 12 $\frac{1}{2}$ inches maximum; pitch $2\frac{1}{4}$ D.P.; whole depth, 5 inches maximum; face width, 2 $\frac{1}{2}$ inches maximum; and dull surface finish.

Due to the attachments, the machine is not suitable for operation in a side cutting position. The work is held in a hand and rapid



Gleason No. 17
Hypoid Grinder

ratio 1 to 1-4 $\frac{1}{2}$ to 1 with shafts at 90 deg.; wheel diameters, 5 $\frac{1}{2}$ to 13 $\frac{1}{2}$ inches; feeds, 1.9 to 11.8 seconds per pass per tooth; floor space, 65 $\frac{1}{4}$ x 111 $\frac{1}{4}$ inches.

Bremacc No. 2 Down-Cut Milling Machine

A milling machine primarily designed for down-cut milling but also adaptable for conventional milling is now being



Bremacc No. 2 Down-Cut Milling Machine

manufactured by the Bremacc Corp., 9114 E. Forest Ave., Detroit, Mich. In performing down-cut milling operations, the machine is said to produce smooth, dull surfaces free from chatter markings. According to the manufacturer, spiral fluted cylindrical cutters, face and side cutters, and grooving and profile cutters can all be used with equal facility in performing down-cut milling operations with the machine.

Due largely to a sensitive screw feed attachment built into the spindle housing, the Bremacc No. 2 Down-Cut can be used in performing precision boring operations of all kinds on production work as well as in precision tool building. Vertical cross and longitudinal hand and power feeds together with rapid traverse are also included as con-



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Should Not Be
Ignored - -**

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IS DANGEROUS!**

**LEIMAN BROS.
DUST COLLECTOR**

**Individual Motor-
Driven Units
For**

**SURFACE GRINDERS
DOUBLE END GRINDERS
SAWS, SANDERS, ETC.**

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168-1 Christie St.
Newark, N.J.

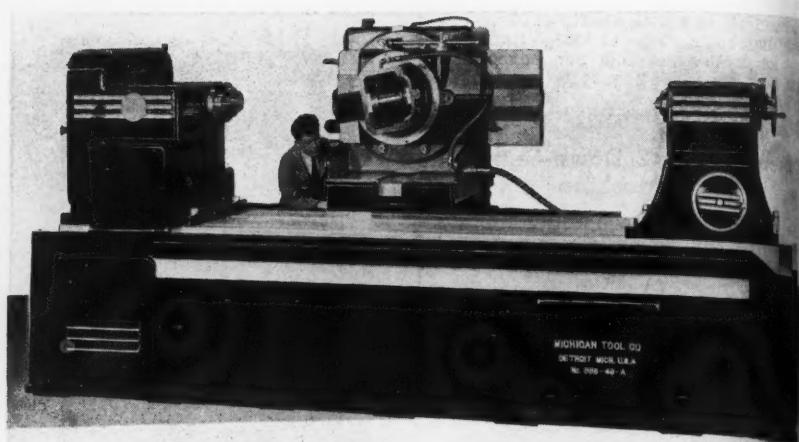


Fig. 1—Michigan 865-48 Rotary Crossed-Axis Gear Finishing Machine

struction features of the machine.

Ruggedly constructed, the Bremacc No. 2 Down-Cut Milling Machine is completely streamlined, with all levers located within easy and quick reach of the operator.

Michigan Rotary Crossed-Axis Gear Finishing Machine

A line of rotary gear finishing machines making available the crossed-axis principle of gear shaving for large gears is announced by the Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich. The line includes three sizes, the largest being capable of finishing gears up to 4 feet in diameter and 20 inches face width. This machine, according to the manufacturer, is the largest ever built for gear shaving and

is already in operation in actual gear production in a plant engaged in defense work.

By adapting the crossed-axis shaving principle to the finishing of large gears such as those used in speed reducers for ships and large power plants, heavy machinery, machine tools, ordnance and so on, quietness, accuracy, and service life can now be made comparable to corresponding features of smaller gears for which the principle has been available for some time. Due to the extreme accuracy of tooth form obtained when the shaving process is used, it is also often possible to maintain the same capacity even though the gear size is reduced, thus making possible smaller housings and more compact speed reducing units.

Designated as the 862-24, 862-36, and 865-48, the three sizes of gear finishers are capable of finishing gears up to 11

INSPECT Internal Surfaces, Recesses and Hidden Contours

Also direct vision,
retrospective and
for oblique systems.



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WAPPLER Industrial Telescope

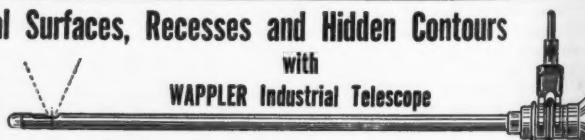


Illustration above shows right angle vision possible with the Type "A" telescope. Perhaps we can solve your inspection difficulties. Send us a blueprint with details of your particular problem.

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American Cystoscope Makers, Inc., 1241 Lafayette Ave., New York, N. Y.



DOBS
NST

30% LONGER



Action photo of bobbing operation in plant where Texaco Cutting Coolants are in use 100%.

JOB-LIFE INCREASED 30%, without reducing feeds or speeds. The cutting coolant used in this plant for bobbing operations, both rough and finish, is *Texaco Transultex Cutting Oil A*.

Transultex carries away the heat, prevents chip welding and assures finer finish and increased life for cutters of all kinds. It is *transparent*, practically odorless at room temperature, and machine operators can see their work at all times.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred also in the metal cutting field.

These Texaco users enjoy many benefits that can also be yours. A Texaco Engineer specializing in cutting coolants will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distribution points in the 48 States, or write:

The Texas Company, 135 East 42nd St., New York, N. Y.

RETURN METAL DRUMS PROMPTLY . . . thus helping to make present supply meet industry's needs and releasing metal for War Needs.

THEY PREFER TEXACO

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

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FOR THE METAL-WORKING INDUSTRY

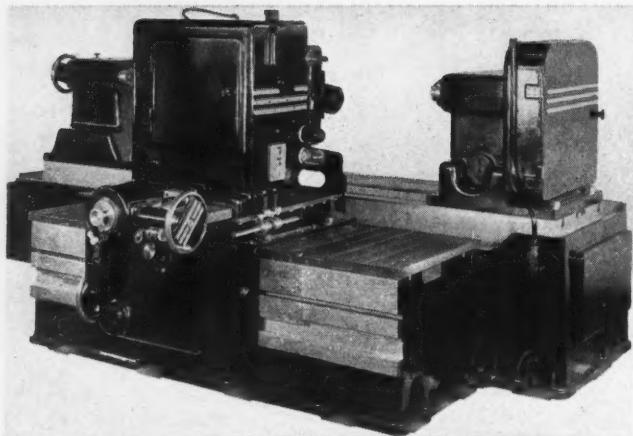


Fig. 2 — The column of the Michigan 8648 Rotary Crossed-Axis Gear Finishing Machine is equipped with colored lights to indicate various circuit conditions during operation. Control of the machine is entirely electrical.

36, and 48 inches diameter respectively. The minimum size of gear that can be shaved is 1 inch for the 862-24, 2 inches for the 862-36, and 4 inches for the 865-48.

In the smaller machines, a total of four spindle speeds ranging from 109 to 313 r.p.m. is provided. Feeds of the smaller machines range from 0.314 to 9.485 inches per minute in 12 steps. In the largest machine, the range is from 0.45 to 7.2 inches per minute in six steps. The distance between centers of the 24-inch machine is 36 inches, and the 36-inch machine, 48 inches. Longer machines are available on special order. Although for most shaving operations a work speed of 300 feet per minute is recommended, the machines are capable of operating at from 100 to 400 feet per minute for gear diameters within their capacities.

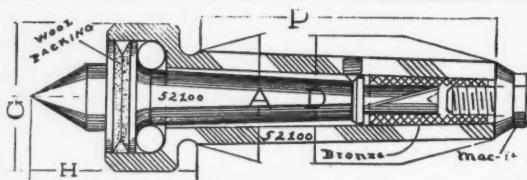
In the 24 and 36-inch sizes, the method of operation is by cutter reciproca-

tion; that is, the cutter is power driven and the work "follows." The work is reciprocated axially during the cutting cycle, while the cutters are fed radially into the work. Operation of

speeds and feeds is mechanical.

The 865-48 machine utilizes the principle of rotating the work in engagement with the shaving cutter. The cutter follows across the face of the gear at a predetermined speed. Two optional methods of finishing the gear are available. With the first, the cutter slide may reciprocally translate parallel to the work axis. At each end of translation, the cutter is fed toward the work until a limit is reached. The cutter then travels a predetermined number of translations before automatically terminating the cycle. With an internal attachment, this method of gear finishing is also employed except the feed is reversed.

With the second method of gear finishing the cutter slide is set in a vertical position, in which case a complete cycle consists of one translation of the cutter and return at right angles to the work axis. With this method, a num-



I did so... it stood up for 29 months... and I got pay for several dozen.

Solicited Shop Foreman said, "I like your Live Center, but I cannot buy... but if you put one on that Crank-Shaft lathe and it stands up for 30 days, I will see that you get paid for it."

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The column
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Crosses-
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the various
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tion. The
e machine
electrical

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ABOUT SIMMONS NO. 2 TURRET LATHE

We are merely presenting facts when we tell you that the Simmons No. 2 Turret Lathe (1 1/4" Bar Capacity) offers high precision at low cost . . . that with the Micro-Speed Drive you can select instantly any of 1,000 spindle speeds by the turn of a handwheel located adjacent to the Selector Dial Control on the new cabinet base . . . that the spindle brake is an important asset for short-cycle operations.

We prefer to turn the job of providing superlatives over to some of the many important firms that have found in this sturdy machine the answer to their No. 2 Turret Lathe problems. Firms such as Bell Aircraft Corporation, Bendix Radio Corporation, Cessna Aircraft Company, Fairchild Aircraft, Ltd., Sterling Engine Company, Swift Lubricator Company, Dominion Engineering Corporation, Ltd., and many others. Ask for copies of their comments when you write today for a Descriptive Bulletin.



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SIMMONS MACHINE TOOL CORP.

1745 NORTH BROADWAY, ALBANY, N. Y.

NEW YORK CITY OFFICE: 149 BROADWAY

ber of feed and finishing translations can be obtained in the same manner as with the first method. The second method of feeding is also available for the smaller machines on order.

Control of the 865-48 machine throughout its operating cycles is entirely electrical. The machine column (Fig. 2) is equipped with red, amber, and white lights to indicate to the operator various circuit conditions existing during the operation of the machine. The red and amber lights are controlled by limit switches. The white "work" light indicates when the power is connected but is turned off during the automatic cycle of operation. The operating cycle can be terminated at any time by pushing a stop button.

In the 865-48 machine, selector switches determine the direction of rotation of the work. A "jog" button permits inching the work drive motor in a forward direction for the set-up process. Full overload and under-voltage protection for the machine are provided by an interlock and several thermal overload switches. The control panel is mounted near the machine, with one rigid and one flexible conduit coupling the two.

The 48-inch machine has an overall bed length of 176 inches, height of 74

inches over the spindle drive head, and height of 78 inches over the cutter head. From the operator's control position at the back of the machine to the front of the bed is 119 inches.

As shown in Fig. 1, the 865-48 machine is equipped with two sets of work centers having a maximum distance between centers of 97 inches. Work weighing more than 2,500 lb. can be supported between the larger of the two pairs of centers. Thus the machine can handle a gear mounted on a shaft thereby eliminating any possible error in concentricity due to mounting the gear on the shaft.

Cone-Drive units are embodied in the design of all machines. In the 24 and 36-inch machines, one unit is used. In the 48-inch machine, three units are employed in the various gear trains for feed and work rotation. In the 24 and 36-inch machines, both cutter drive and feed are operated by a single motor.

In the 48-inch size, a motor for the main work drive and one for the feed are used. The work drive employs two Cone-Drive units of 4 5/6 to 1 and 15 to 1 for the small and large work spindles respectively. These units and suitable change gears are mounted in the spindle drive head (left side of Fig. 1), and

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combined with a variable speed reversible d.c. motor, provide all forward and reverse speeds ranging from 40 to 375 r.p.m. for the small spindle and from 7 to 44 r.p.m. for the large spindle.

Electric controls for d.c. operation are mounted on a separate panel placed near the machine. When a.c. operation is desired, the electrical controls are mounted within the base of the machine. With an a.c. constant speed motor, three speeds for the large spindle and four for the small spindle are provided.

Cleveland No. 1 Vertical Milling Machine

To meet the demand for a small, rigid, high speed vertical spindle milling machine—a machine whose design embodies all essential features required by modern toolrooms, die and mold shops, and production plants—The Sommer & Adams Co., 18511 Euclid Ave., Cleveland, Ohio, has brought out the Cleveland No. 1 Vertical Milling Machine illustrated herewith.

The vertical spindle of heat-treated and accurately ground chrome-nickel

steel is mounted in an accurately ground quill on preloaded precision ball bearings and is counterbalanced by a weight suspended in the column. The spindle is direct driven at four high speeds from a flange mounted motor by a V-belt and four-step cone pulley. Eight lower speeds are obtained through double back gears, making available a total of 12 speeds ranging from 100 to 1,850 revolutions per minute.

The slides on the column, knee, saddle, and table are accurately scraped to provide the degree of accuracy required. All bearing surfaces are of proper length to assure rigidity.

The table has 12 automatic longitudinal feeds ranging from 0.6 to 12½ inches per minute. The gears in the feed box are made of heat-treated alloy steel and are fastened on spline shafts which are mounted on Timken roller bearings.

The cross feed screw and table screw are mounted on double row Timken bearings to permit free movement thereby making the machine unusually sensitive in operation, particularly when using small mills.

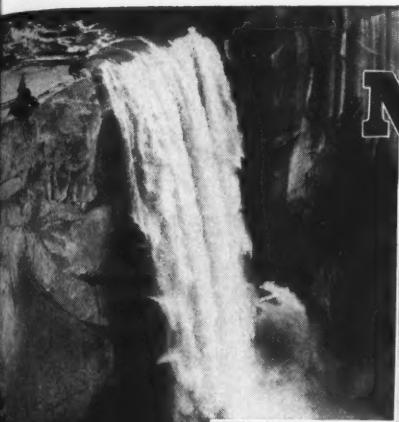
The column has a coolant reservoir in the base. A coolant pump is available as an optional piece of equipment with the machine.

SHEAR-CUT HIGH SPEED END MILLS

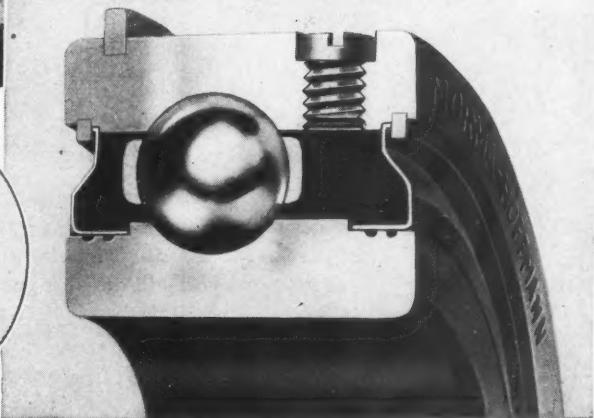
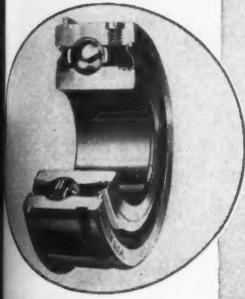
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Single and Double End Mills.

They save time and money.
Specify Progressive Shear-Cut End Mills.
Write for catalog and prices.

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2345 WOLCOTT ST. FERNDALE, MICH.



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What water means to the earth, lubricant means to a bearing—life itself. As the mountain stream provides an abundant and constant flow of water, so the exceedingly large grease capacity of the "CARTRIDGE" BALL BEARING provides constant and abundant lubrication to raceways and rotating elements. In the cross-section, note how DOUBLE-ROW **DEPTH GIVES THE "CARTRIDGE" BEARING DOUBLE THE GREASE CAPACITY** of the single-row type—guarding against premature dryness; the in-built metal seals confine the grease **WITHIN THE BEARING ITSELF**, re-

GARDLESS OF THE ANGLE OF THE SHAFT.

The close-fitting, wearless metal shields, and recessed inner ring construction with two or more grease grooves, form a truly effective labyrinth through which **THE GREASE CANNOT PASS AND DIRT CANNOT ENTER**.

Adopt the "CARTRIDGE" BALL BEARING as your insurance against neglected lubrication, and dirt and grease contamination. It needs no supplementary closure parts; provides easier and quicker assembly and disassembly. **IT STAYS CLEAN**, and has convenient regreasing and inspection features.

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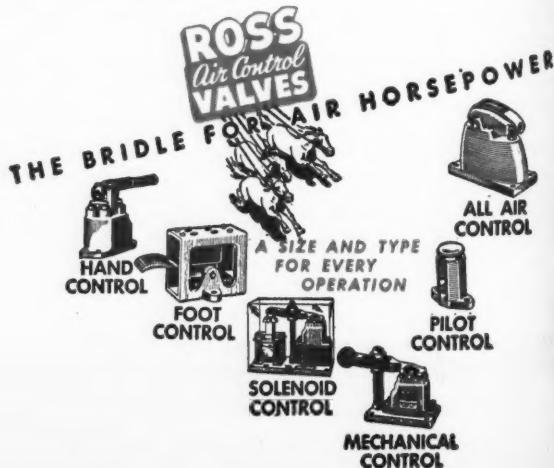
PRECISION BALL, ROLLER and THRUST BEARINGS

As a private in the ranks, Ross has enlisted for "the duration".

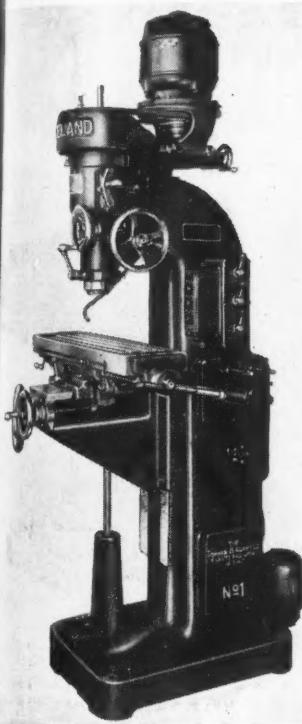
In such matters as government need for air control valves, Ross expects to be a good soldier. . . . To do its part well and willingly—as it knows you will do your part.

United effort will surely bring VICTORY!

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specifications of the Cleveland No. 1 Vertical Milling Machine are as follows: longitudinal feed, 18 inches; cross travel, 8½ inches; vertical travel, 16 inches; working surface of table, 8 x 32 inches; three 17/32-inch T-slots, center center, 1½ inches; table feeds, 12 inches range from 0.6 to 12½ inches per minute; spindle, taper No. 30; spindle



Cleveland No. 1 Vertical Milling Machine

speeds (choice of two ranges), 12 speeds, 400 to 1,850 r.p.m. and 12 speeds, 200 to 1,000 r.p.m.; motor, 1½ h.p.; cutter capacity, ½ to 2½ mills; floor space, 36 x 48 inches; net weight, 1,600 lb.; shipping weight, 1,800 pounds.

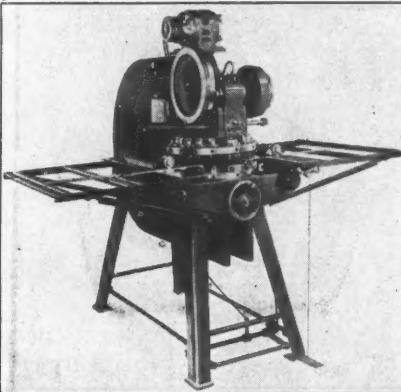
Super M & L Tapping Machine

Known as the Super M & L, a tapping machine designed for precision tapping to $\frac{1}{8}$ inch, including $\frac{1}{2}$ -inch pipe,

SPEED UP SHORT RUN PIERCING JOBS

Save time lost in lengthy die changes and gauge set-ups. Reduce handling operations and costs.

Use WIEDEMANN TURRET PUNCHES



Type R-41P, motor driven, 28" throat, carrying 18 punches and dies. Capacity 12 tons. Gauging table shown will reduce or eliminate layout time.

TURRET PUNCHES ranging from hand operated types to 80 ton power units for almost all requirements. Tables to make templates and hold the dimensions within $\pm .002$. Other tables for following and duplicating templates. You can reduce the time needed on your short run piercing operations tremendously.

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Flexoid

INDUSTRIAL
Couplings



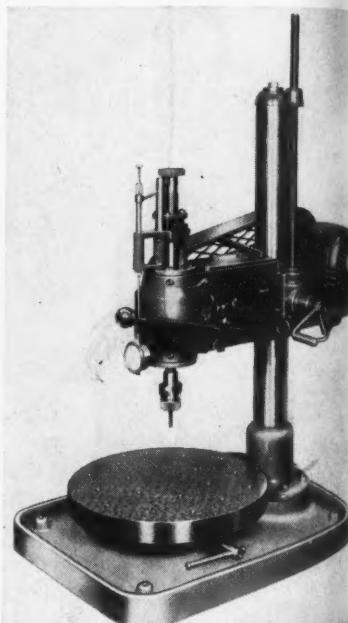
THESE sturdy couplings with their flexible rubberized fabric discs definitely do "Keep 'em Turning" without requiring any lubrication or attention. Creates a flexible joint in shafting that aids in eliminating wear and tear on the driving units.

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which will meet Army, Navy, Aeronautical, Radio, and other government specifications, has been introduced by the Pacific Tool Supply Co., 344 N. Vermont Ave., Los Angeles, Cal. The machine is also designed for any type manufacturing where No. 3 and No. 4 specifications are demanded.

The spindle of the machine is floating. The tap is guided by precision



Super M & L Tapping Machine for Precision Tapping to No. 3 and No. 4 Specification

leads which can be easily and quickly changed. Leads are available for all screw pitch, right or left-hand threads.

The tapping handle of the machine can be set at any convenient position and when released automatically throws the spindle into neutral. For bottom tapping, the machine is equipped with a dial indicator. Four speeds are readily available.

Simply constructed and designed for speedy operation, the Super M & L Tapping Machine is supplied equipped with one lead and lead nuts to meet individual requirements. Precision ball bearings are used throughout the construction of the machine.

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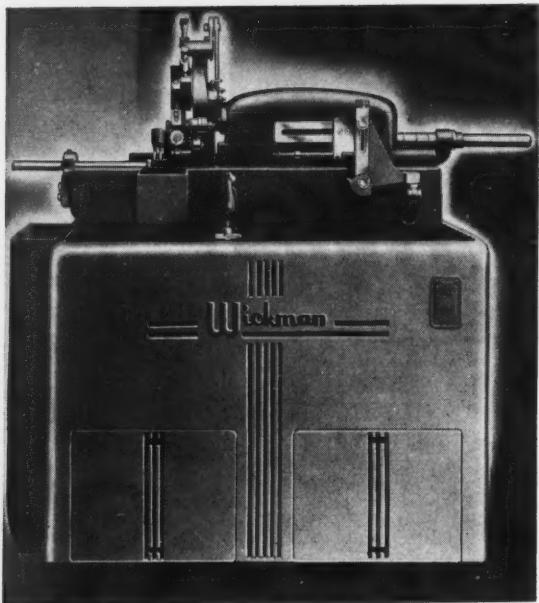


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Wickman High Speed Precision Automatic



Wickman High Speed Precision Automatic

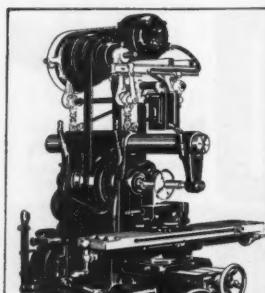
A Swiss type automatic lathe has been introduced by the Wickman Corp., 15533 Woodrow Wilson Ave., Detroit, Mich. The machine, which is known as the Wickman High Speed Precision Automatic, is designed for use on a wide variety of work. It is said to be particularly adaptable to the production of pinions, shafts, and long slender parts used in the manufacture of clocks, meters, and precision instruments for aircraft and other fields. In armament work, the machine, it is claimed, has proved

extremely efficient in the production of striker pins, detonators, and pinions for fuses.

The principal features of the Wickman Automatic are the sliding headstock and the toolhead, which is equipped with five tools operating radially. Only single point turning tools are used and all tools are provided with micrometer adjustment in both directions.

Finish, accuracy, and concentricity of work is maintained by a guide bushing in the toolhead. This bushing revolves on a separate bearing, keeping a constant grip on the work or bar. The bushing can be locked stationary and becomes a slip guide for the bar when required. On jobs where no supporting guide is needed, the bushing assembly can be removed, thus permitting the spindle nose to travel directly up to the tools.

The work is fed through the tools by the headstock. All movements of the headstock and tools are controlled by cams. By a combination of headstock and tool movements, any angle or form can be produced without form tools. With the machine, it is claimed, there are almost no limitations to the scope of back shoulder work which can be performed. Many parts, even those incorporating a pivot point, can be finished in the cutoff, thereby eliminating



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Diamond special-purpose files, particularly, must be used properly for best results on the metals and jobs for which they are designed.

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any need for second operations.

The Wickman High Speed Precision Automatic incorporates a number of outstanding features of construction. Among these is the spindle which is driven by an endless flat belt that can be quickly replaced when necessary. The headstock drive pulley is mounted on an independent ball bearing, thus eliminating belt pull on the spindle. The toolhead, which is of unusually substantial construction, is provided with five tool slides. An accelerating mechanism built in the gearbox speeds up the cam-shaft during non-cutting periods.

Additional features of the machine include a chain drive to the cam-shaft with geared feed changes, safety devices for cam-shaft overload and belt breakage, a wide range of spindle speeds, and ample chip and coolant capacity.

Douglas Precision Slotter

Adaptable to both toolroom and production work, a precision slotting machine available with 7½, 8½, or 10-inch stroke has been brought out by the Douglas Machinery Co., Inc., Dept. 805, 150 Broadway, New York, N. Y. Ac-

cording to the manufacturer, the universal usefulness of the machine results from the vertical design and swiveling ram head and toolholder. Automatic circular table with independent automatic feeds in all directions, accurate operation of ram brake, and easily adjustable stroke are additional features of the machine.

The column and base are made of high tensile casting with heavy ribs to prevent deflections under the most severe cuts. The base is of massive construction, thereby giving the machine the most excellent foundation. The guideways are generously proportioned and accurately fitted to very close limits.

The ram guide, being of exceptional length, affords the ram a long range of travel, while a full length taper gib with screw adjustment provides for maintaining an accurate fit between ram and guide. The ram driving mechanism is of the crankpin and sliding block type, providing a steady forward and quick return stroke. The length of stroke can be regulated by loosening check nut and sliding crankpin block to the desired position.

The ram can be stopped or started at any point of stroke independently of the motor by means of a friction clutch and

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**Motor Drive
Infinite Spindle Speed**

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Speeds from: 90 to 1800 RPM
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Capacity: 1" x 6½" turning length

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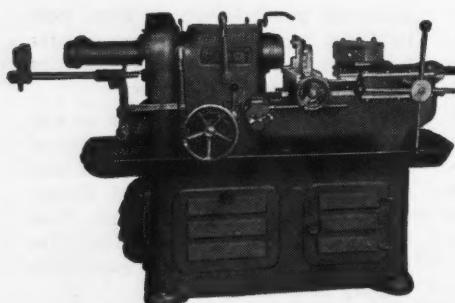
No. 3

Speeds from: 60 to 2100 RPM
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Timken bearings for the main spindle — all others anti-friction.

Any spindle speed you want — a direct reading dial shows when you've got it. Permits the use of carbide tools for fast cutting.

Turret clamps and unclamps automatically.

Equally effective on second operation and chucking work.

MOREY MACHINERY CO., Inc., 410 Broome St., New York, N.Y.

the machine results in swiveling. Automatic adjustment is accurate and easily adjustable features.

are made of heavy ribbed steel. The most massive construction machine. The guide is tensioned and has no limits, excepting the working range of the taper guides. Provides for a choice between swiveling mechanism and sliding. Push forward the length of the lamp, loosening the block to

started at the clutch and

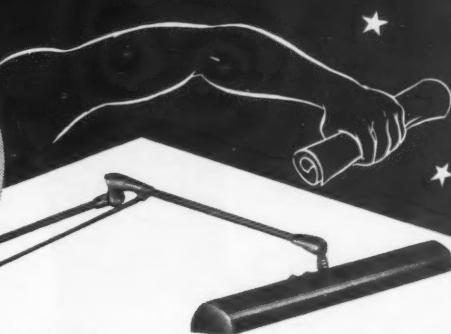
ATHES
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Speeds

1800 RPM
3600 RPM
Working length
No. 629

2100 RPM
3600 RPM
Working length
No. 727

of it.

Just as
Flexible
as Your Arm



The New

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INCANDESCENT FLUORESCENT

Think how easily you can swing your arm to any desired position. That's how swiftly, how effortlessly, a touch of your hand will float the Dazor Lamp wherever you want it. Push, pull, raise, lower or twist it—the light stays put. No screws to tighten!

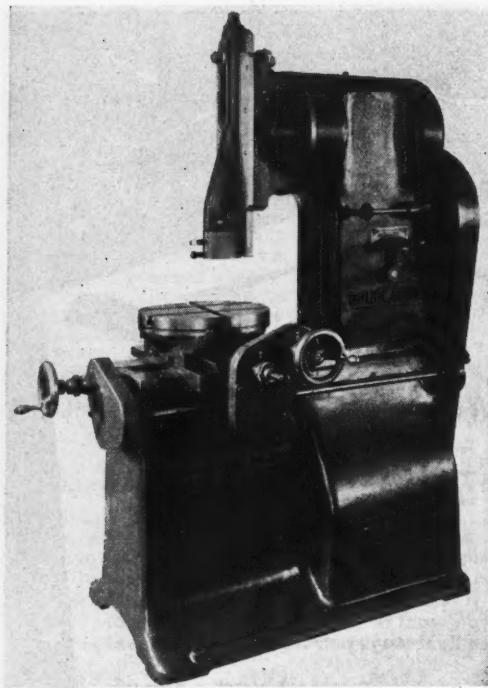
Three exclusive features explain the Dazor's popularity: (1) Enclosed Patented Spring Balance, which automatically holds the light firm; (2) Maximum Adjustment, a 6-ft. spherical field; (3) Combined Manual Switch and Starter.

Fasten the Dazor Floating Lamp to your machine, bench, drawing board—anywhere. All models either Incandescent or Fluorescent. Call the Dazor-appointed electrical wholesaler near you. Or write for literature and distributor's name. Do it today, for comfort . . . economy . . . greater and safer production.



UNIVERSAL MODEL

DAZOR MANUFACTURING CO.
4483 DUNCAN AVE. ST. LOUIS, MO.



brake controlled by a lever. The position of the ram in relation to the work height may be altered independently from the driving mechanism by releasing binder and adjusting ram by means of vertical screw. The ram may be actuated by hand for set-up purposes through a handwheel at the back of the machine.

The swiveling ram head is mounted with the ram in such a manner as to

make the head and ram practically one unit. The head is massively constructed and proportioned to withstand the severest stresses. Heavy ribs are provided to ensure rigidity. The head can be swiveled 15 deg. either side of the vertical position and locked in any angle by means of a very strong locking mechanism. The vertical (zero) position of the head is located by a plunger.

The toolholder is carried in a clapper box which is so mounted that the thrust of the cut forces it rigidly against the head, and has the same action as the clapper box on a horizontal shaper. The toolholder permits the use of tools with either round, square, rectangular shafts and can be swiveled 90 deg. left or right. Where it is desired to rotate tool 360 deg., an additional interchangeable universal toolholder can be supplied as an extra.

The cross slide on which the rotary table is mounted is of rigid construction to prevent distortion or bending of any part of the unit when work is being clamped on the table. All slides are provided with taper gibbs to maintain proper relation between bearing surfaces. The T-slots in the table are conveniently located and permit the bolting of work in any desired position.

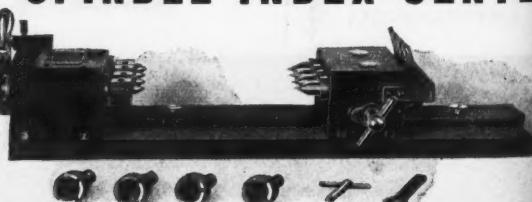
The rotary table is equally suitable for circular shaping of either outer or inner circumference of work. The outside diameter of the table is graduated in degrees. Provision is made for clamping the table to the saddle should

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MULTIPLE SPINDLE INDEX CENTERS

Three and four spindles of various types and sizes.

Write for circular.

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RIGHT NOW! ... these Low-Cost DRILL PRESSES will cure your drilling headaches



No. 1370
—Floor type
17-inch "Slo-Speed"
Delta drill press with
No. 2 Morse Taper
Spindle and standard
tilting table. Shown
with motor.

When you are confronted with an urgent need for a quick increase in production capacity in connection with the U. S. armament program—you should, at once, check into the possibility of utilizing the low cost Delta Drill Presses. These efficient and flexible machines are in active use in plants all over the country—as production line equipment—auxiliary machines—for special set-ups—and in hundreds of tool rooms. Their first cost, and their operating costs, are low—they are sturdy, accurate and easily adaptable to your special needs.

New Delta Power-Feed Drill Presses

Incorporate many special features and offer a wide range of feeds. Include single and multiple spindle 17" units, in slow speed and high speed models, with table-raising or head-raising mechanisms.



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Don't judge the value of Delta drill presses to your shop by their low cost. Get the facts! Fill out the coupon and send for the complete catalog of Delta low cost drill presses.

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THE DELTA MFG. CO.
601-B E. Vienna Avenue, Milwaukee, Wis.
Please send me catalog of Delta Machines, giving
specifications and prices on Delta Drill Presses.

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fixed table be desired. For dividing work, a dial is fitted to the driving worm, reading divisions of the table movement as close as 1/12 deg. or five minutes.

Both hand and power feeds for all table movements—rotary, longitudinal, and transverse—are provided. These feeds are variable and reversible and are operated through jaw clutches and ratchet feed, all of which are located within easy reach of the operator. Micrometer dials are provided on all three feed screws to ensure accurate setting. In the case of power feed, the feeding action always takes place on the up-stroke.

Speeds are obtained through a change gearbox by means of a control lever located within easy reach of the operator. All gears in the speed change unit are of heavy duty steel and generously proportioned. Lubrication is obtained by a constant flow of oil from a reservoir in the base of the housing.

The base of the machine is enlarged at the rear end, providing space for the motor to be mounted on an adjustable bracket. Power is transferred to the flywheel by a V-belt drive. The flywheel and gearbox are joined by a well proportioned clutch.

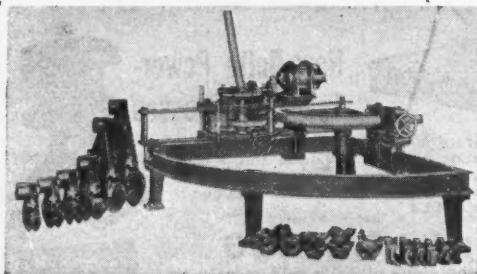
Bradford "Metalmaster" Geared Head Lathe

Illustrated herewith is the Bradford "Metalmaster" Geared Head Lathe which has been announced by The Bradford Machine Tool Co., Cincinnati, Ohio. The headstock is ruggedly and simply constructed and is said to be unusual free from vibration. The spindle rotates on heavy duty precision roller bearings and can be easily adjusted when necessary.

Twelve speeds, in geometric ratio, are available in both forward and reverse directions. Gears are shifted by lever conveniently located at the front of the head, a direct reading index plate being provided to indicate the lever position for all speeds.

The headstock spindle is made from high carbon molybdenum steel forged and is threaded on the nose, which is bored to receive a taper bush and center. The spindle extends through the head, thus allowing for the use of draw bars and tubes for draw-in attachments.

The headstock is driven by a constant speed standard frame motor, which is mounted on an adjustable hinged plate in a heavy, well ventilated leg, and is easily accessible for oiling and inspection.



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Announcing
A LINE of "FINISHERS"
FOR LARGER GEARS



Largest of the new Michigan line, the model illustrated will handle gears up to four feet diameter.

MAKING AVAILABLE the crossed axis principle of gear finishing for all sizes of gears up to 4 ft. diameter, this new line of "Michigan's" is designed to provide quietness, accuracy and life for large gears comparable to those now achieved in smaller gears by use of the "shaving" process.

Today, in the smaller sizes of gears—up to 18 inches—more gears are finished on Michigan's than on all other types combined. "Tomorrow," probably the majority of large gears will be shaved.

And in such gears... for speed reducers for ships and power plants... for machine tools and all kinds of heavy machinery... for ordnance, etc.... the use of this process will probably make possible a reduction in size by virtue of the higher load capacity obtained through greater accuracy.

The new line comprises three machines,

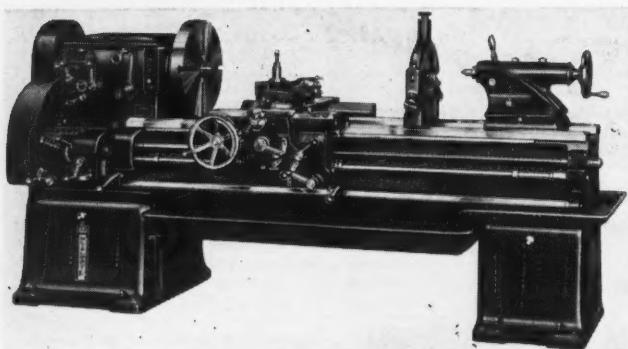
as shown below. All machines are designed for heavy duty, and will take gears up to 20 inch face width.

The machine illustrated is an 865-48—the largest gear finisher ever built. It is already in operation turning out gears in a defense production plant.

Model	For Gear Diameters		Distance between Centers (in.)
	Max. (in.)	Min. (in.)	
862-24	24	1	36*
862-36	36	2	48*
865-48	48	4	97

*May be increased on special order.

MICHIGAN TOOL COMPANY
7171 E. McNichols Road, Detroit, U. S. A.



Bradford "Metalmaster" Geared Head Lathe

tion. The drive is through multiple V-belts and an oil immersed multiple disc clutch. The clutch is operated by two handles, one at the front of the bed near the head and the other at the right of the apron within easy reach of the operator. A multiple disc brake is operated by these same handles thus jogging is effected at all times with the motor running.

Both clutch and brake are easily adjustable from the rear of the clutch housing. The drive sheave is mounted

on a stub shaft supported on tapered roller bearings mounted in the clutch housing. Starting, reversing, and stopping are effected by electrical control. The control push buttons are located at the front of the head within easy reach from the operator's position and all live electrical mechanisms and connections are totally enclosed within a separate enclosure in the headstock. The magnetic electrical contactors are mounted in a totally enclosed compartment in the motor leg with easy access for inspection. The motor is protected by overload thermal cut-outs with automatic reset and no-voltage release. All electrical wiring is in armored conduit to prevent accidental contact with any live electrical connections.

**There's no operation this machine can't handle
with only
ONE WORK SET-UP**

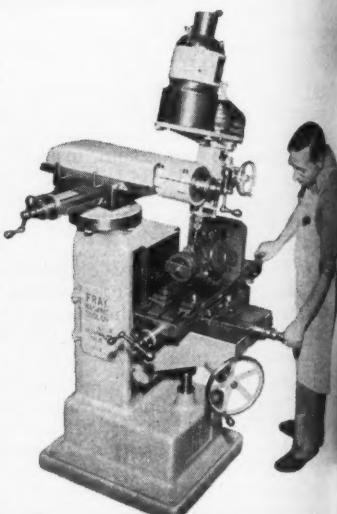
You can handle every milling, drilling, boring, grinding job—at any angle or compound angle—in horizontal and vertical planes—without changing the work set-up.

On a Fray "All Angle" Milling Machine you have 10 inches of cross travel above the table. The Turret Head is 11 1/2" in diameter, machine calibrated the full 360°.

The Head can be rotated a full 360° in both planes, for any angle or compound angle. The Ram has 10° of in-and-out movement.

Specifications of the Fray No. 7-B are identical with those of the Fray No. 7, proven by toolmakers all over the world.

**FRAY UNIVERSAL
MILLING MACHINES**
FRAY MACHINE TOOL CO.
503 W. Windsor Road Glendale, California



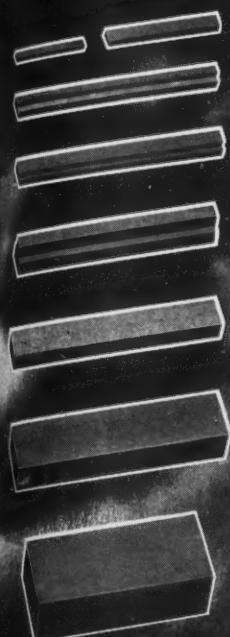
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Uniformity



UNIFORMITY of size, shape, wear and cutting quality means the difference between efficiency and waste in abrasives.

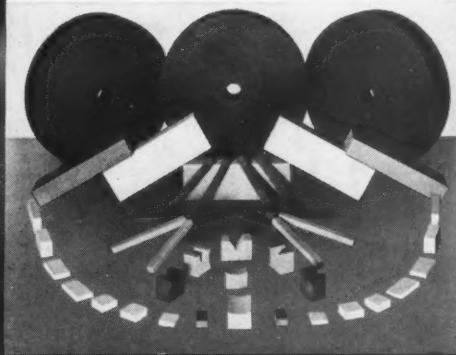
MID-WEST honing stones are absolutely uniform in all characteristics because they are made with Micro-Super-X-Bond, hence their hardness and grain structure can be CONTROLLED to degrees never before attainable.

MID-WEST honing stones generate as much as 90 per cent less heat while cutting much faster than stones manufactured with any other bonding agent. Because they wear evenly they do their work more efficiently and because they last longer they turn out more work per set. To use **MID-WEST** stones is to save time and money.

MID-WEST stones, naturally, cost more than average honing stones. But their quality and performance make them more economical in the long run. **MID-WEST** engineers invite you to let Micro-Super-X stones help you solve your honing problems. Samples shipped from stock immediately.

MID-WEST ABRASIVE COMPANY

Manufacturers of grinding wheels, sandpaper and emery cloth
Owosso, Mich., Factory • Detroit, Mich., Executive Office • Rochester, Pa., Factory



MID-WEST ABRASIVES

A one-piece casting constructed to preclude the entrance of chips and dirt is firmly fastened to the bed and houses the mechanism for feed and thread cutting changes (64 changes including 11½ threads). The mechanism is simple and easy to operate and changes can be made instantly. An index plate showing both feeds and threads indicates directly the corresponding position of the steel tumbler yoke and compounding levers. A semi-steel idler gear connects the feed box to the head gearing and can be easily replaced by special compounding or translating gears for odd thread not included in the box or metric screws.

The lead screw is used for thread cutting only and can be disconnected from the quick-change gearing when not in use. The feed rod is used for feeding the carriage for turning, facing, and boring operations. Adjustable stop collars on the feed rod can be set to stop the carriage for turning or thread cutting in either direction.

The apron is a double-walled, one-piece casting of box-type construction. Positive jaw clutches are used for both length and cross feeds and are controlled by a single lever. Length or cross feeds cannot be accidentally engaged when either of the other is in use.

The feed reversing operating lever and half nut cam are so interlocked that the lead screw and feed rod cannot both be engaged for feeding at the same time.

The carriage has unusually long wings, with gib both front and rear and a clamp on the right front wing for locking the carriage during facing operations. The bridge is wide and heavy with large dovetail section for cross slide. The chasing dial is constructed as an integral part of the carriage and so located that it can be conveniently read by the operator when cutting threads. The rear of the carriage is planed and tapped to receive a taper attachment. Shear wipers are provided on the ends of both wings to prevent chips and dirt from creeping under bearing surfaces. Large dials reading to thousandths (of diameter) are provided on both cross slide and compound rest feed screws.

The compound rest, with offset handle, is solidly gibbed to the cross slide for its entire length. The swivel base is graduated in degrees for the full circumference and can be read from either right or left side. The tool post is the round pattern type with hardened ring and wedge. The compound rest can be set at right angles with the bed.

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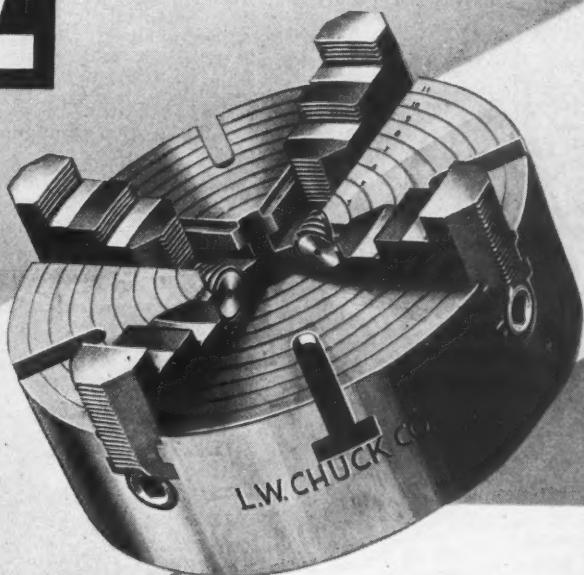


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4 JAW INDEPENDENT L-W LATHE CHUCKS

Semi-Steel body, ribbed construction, hardened and ground steel reversible jaws—Made to stand the gaff. We are proud to offer such Hi-quality at low cost.

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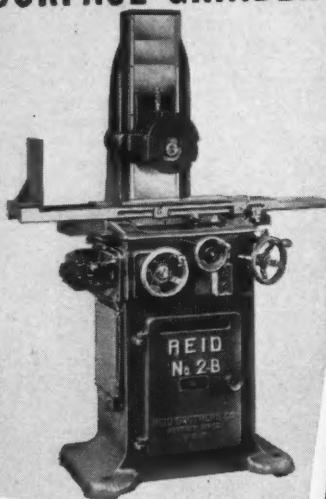
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REID All Electric SURFACE GRINDER



Operated either as hand- or power-fed machine. One switch allows operator to employ spindle by itself or both spindle and feeds. Longitudinal and cross feeds operated by $\frac{1}{4}$ h.p. reversible motor. This feeding arrangement eliminates many mechanical parts and thus insures smoother operation. Good deliveries if priority certificates are attached to orders. Capacity: 6" x 18".

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ways when turning between short centers.

The bed is of semi-steel with ways (two vee and two flat ways) carefully planed and hand scraped to close tolerances for the entire length. Deep walls connected by heavy elliptical cross girders prevent springing under heavy cuts. The bed is supported by heavy cabinet legs at both head and tail ends. A steel rack with accurately cut teeth is fastened to the bed.

The tailstock, which is of the off-set pattern, is long and heavy and is clamped to the bed by two heavy clamps to ensure rigidity. The spindle is of forged steel and is locked by split bushings to prevent misalignment with headstock spindle.

Snyder Radius Contour Milling Machine

The semi-automatic milling machine illustrated herewith has been especially designed and built by the Snyder Tool & Engineering Co., Detroit, Mich., for radius contour milling the bolt bosses



Snyder Radius Contour Milling Machine

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CHICAGO MOUNTED WHEELS

Round and round they go—millions of them—doing every conceivable kind of grinding and polishing job in machine, pattern and die shops, tool rooms, defense plants, foundries, etc.

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Machin

on connecting rod caps. The feature of the machine consists in the three spindles and three revolving fixtures, designed for machining three parts at one time.

The spindles are quill type, ball bearing mounted, and are driven by V-belts through spur gears running in oil; they have quill clamps and vertical adjustment to compensate for tool wear. Coolant is supplied by a pump from a tank in the machine base. The fixtures are mounted on a main slide and are revolved by a cross slide; both slides are hydraulically operated. The machine is electrically controlled by push buttons.

Three parts are loaded on locating pins, in drilled and reamed holes, and manually clamped. The machine cycle is automatic. As the spindles start rotating, the main slide moves forward to the cutters and trips into feed until full depth of cut is reached. The cross slide then revolves the fixtures in a half circle, on the center line of the bolt holes, to mill the radius contour around the bolt bosses. When the cut is complete, the main slide returns to starting position and the cross slide revolves the fixtures back to loading position. The operator reverses the parts in the fixtures and the machine then repeats its

cycle to mill the other boss on each part.

"Stediflo" Variable Delivery Pump

A variable delivery, high pressure pump to be known as the "Stediflo" has been built by the Watson-Stillman Co., Roselle, N. J. By means of a driving member trunnioned on the drive shaft, the pump permits a stepless change of flow of from 0 to 6 g.p.m. at 5,000 lb. per square inch pressure. The driving member can be varied while the pump is in operation to produce a corresponding stepless change in plunger stroke from zero to full 4-inch stroke. The stroke control shaft is extended to the outside of the pump casing for attachment either to a manual or automatic pressure control.

The Stediflo Variable Delivery Pump is said to be especially suited to hydraulic press applications where a rapid advance must be followed by a slow movement at high pressure, and to boiler feed where sudden changes in output affecting the water level are encountered.

The pump is equipped with a 25 hp.

WELD for VICTORY



MARK SAYS: Welding is playing an increasingly important part in defense and Victory.

More and more vital raw materials must be made available for guns, tanks, ammunition, airplanes and new industrial plants.

This can mean but one thing. Present equipment of all kinds in all plants must be kept in service by welding broken parts and reclaiming worn parts by restoring their original surfaces by welding.

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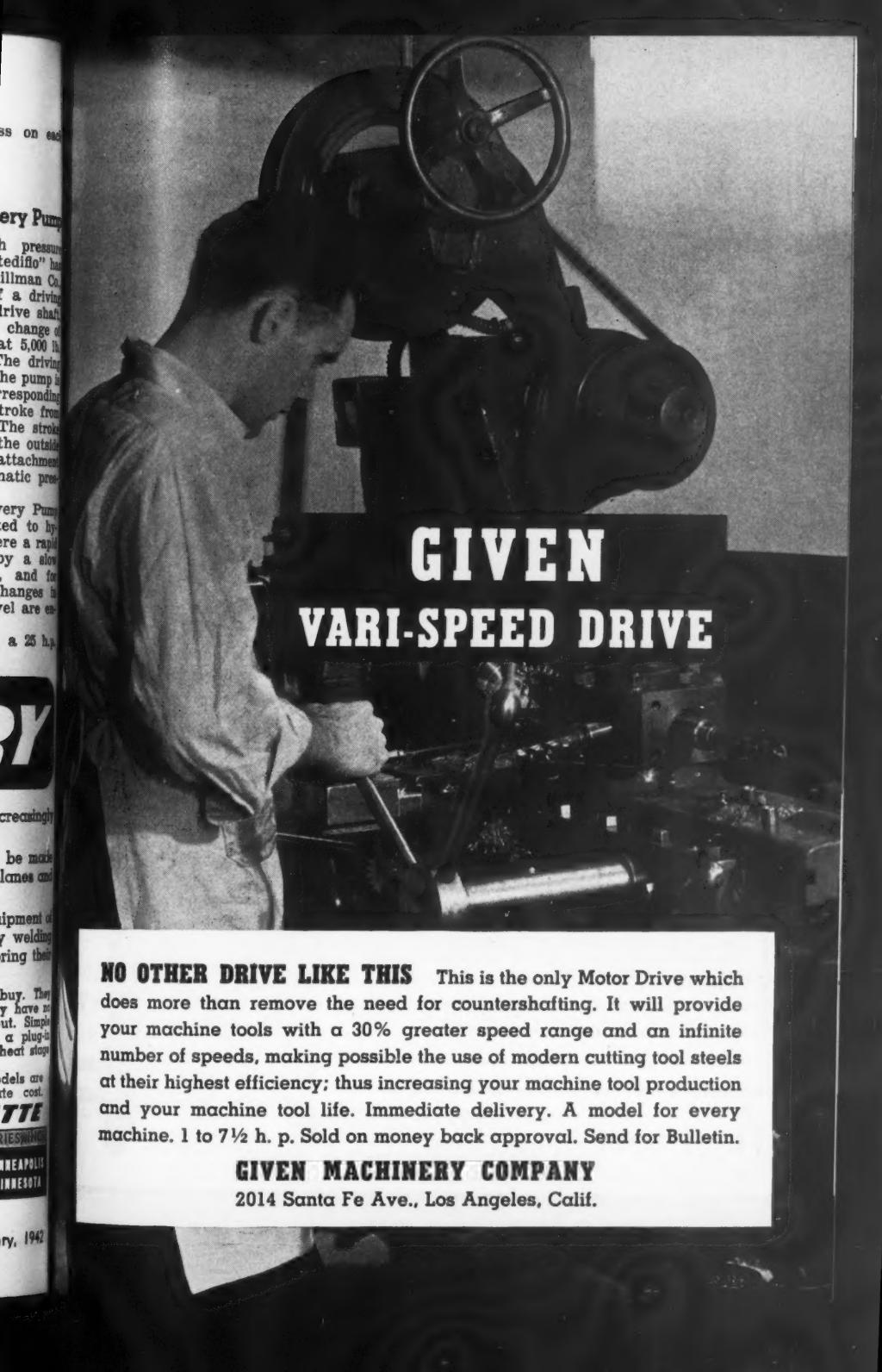
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MARQUETTE A.C. ARC WELDERS ARE APPROVED BY UNDERWRITERS LABORATORIES INC.
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... are the welders to buy. They are built to last. They have no moving parts to wear out. Simple to operate, they have a plug-in for every heat and a heat stage for every job.

Heavy duty truck models are available at moderate cost.

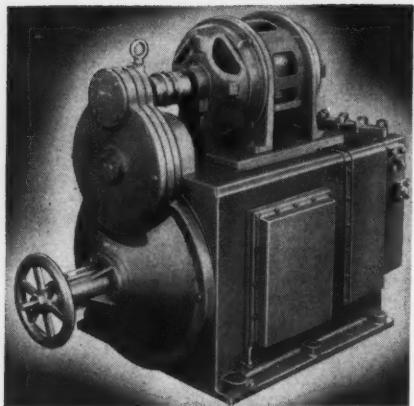


GIVEN VARI-SPEED DRIVE

NO OTHER DRIVE LIKE THIS This is the only Motor Drive which does more than remove the need for countershafting. It will provide your machine tools with a 30% greater speed range and an infinite number of speeds, making possible the use of modern cutting tool steels at their highest efficiency; thus increasing your machine tool production and your machine tool life. Immediate delivery. A model for every machine. 1 to 7½ h. p. Sold on money back approval. Send for Bulletin.

GIVEN MACHINERY COMPANY

2014 Santa Fe Ave., Los Angeles, Calif.



"Stediflo" Variable Delivery Pump

motor, mounted so that the entire unit is but 4 feet high and requires only a 4 x 4-foot floor space. Weight of the pump is 5,000 lb. Pumps for pressures ranging from a few hundred to 8,000 or 10,000 lb. per square inch pressure can also be built.

Hammond "OK" Grinder with Dust Collector

Designed for tool and light snagging grinding, three "OK" Model grinders OK-10, OK-12, and OK-14, each having a self-contained dust collector have been introduced by Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich. The dust collecting unit is mounted inside the base of each grinder. The only parts outside are the fan motor, connecting pipes from wheel guards to dust collector, and air exhaust vent guard.

Three fiber glass filters remove the dust from the air as it is drawn into the collector. Due to the shape of the air ducts within the grinder base, the heavier grinding particles are carried down to a compartment in the bottom of the filter housing. Only the lighter particles and air pass through the filters, which are fitted in a sliding frame and can be easily removed or replaced through an opening provided in the base, as shown in the accompanying illustration.

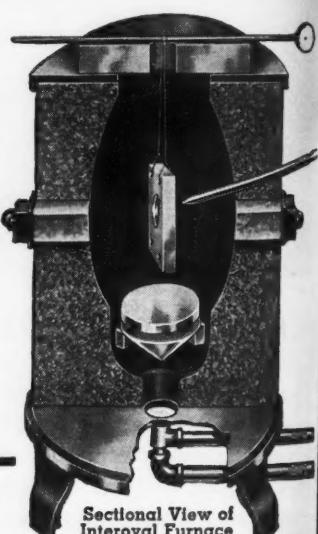
The multi-blade fan, which is the only moving part inside the base, is mounted directly on the fan motor shaft. The

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The INTEROVAL FURNACE is the product of almost a half century of heat treating experience, for hardening expensive tools and dies safely and accurately. No possibility of surface decarburization or distortion. Heat treats "Moly" steels without any trace of scale or soft skin.

Overall size—32" high x 20" in diameter. Heating chamber—14" high, 9" in diameter at center, 7" in diameter at top. Weight—550 lbs.

This furnace is gas-fired and can be operated at an average cost of 25c per hour for fuel. Heats to 2350° F. in 40 minutes. Non-oxidizing atmosphere. May be quickly converted into lead, cyanide or salt bath furnace. Send for new folder giving complete information.



Sectional View of
Interoval Furnace

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COUNTERBORES

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These and many other tools are our contribution to the vital defense program now under way.

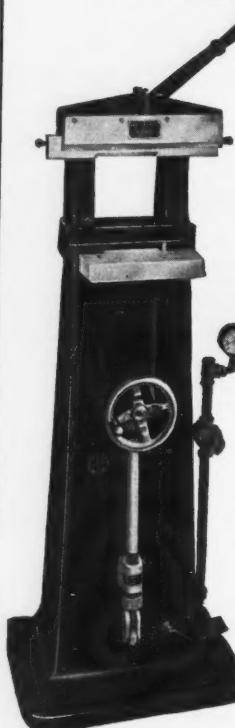
We are doing our utmost to produce tools in quantities ample to serve your production schedules—but never will Weldon quality be sacrificed despite the tremendous demand for quantity.

Weldon tools will not "let you down" in your efforts to do a share in our country's defense.

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**MODEL 25
HI-DUTY
MARKING
MACHINE**

This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.
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CHICAGO, ILLINOIS

fan motor is connected with the switch controlling the grinder motor, thus making the starting or stopping of the grinder and dust collector one operation.

The OK Model grinders with dust collectors are said to require a minimum of floor space, 10 inches of extra space being required for the OK-10 and 14 inches of extra space for the OK-12 and OK-14. The OK Dust Collector can also be built as a separate unit for use with other



Hammond "OK" Grinder with Dust Collector

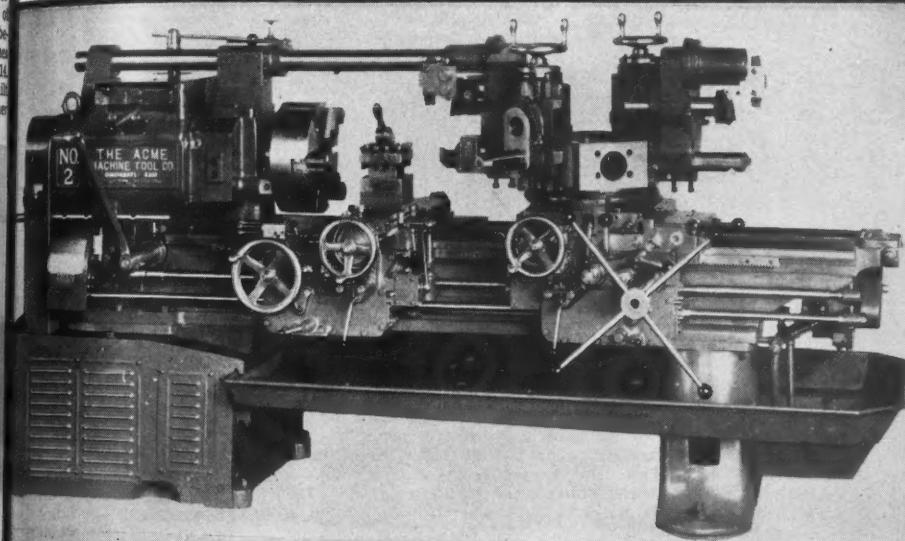
types of grinders which do not permit the use of filters within the base of the grinder.

**Acromark No. 9H Marking
Machine**

Graduated sleeves for binoculars are said to be quickly marked with the No. 9H marking machine announced by The Acromark Corp., 251-257 N. Broad St., Elizabeth, N. J. The machine is designed to mark aluminum, copper, zinc, or plastic sleeves, applying with heat or white or silver filling as sleeves are marked.

To operate, a sleeve is placed on a projecting mandrel which rotates freely in a double set of precision roller bearings. A heated die bearing the gradu-

For Maintaining Rigidity and Accuracy Under Heavier Cuts at Faster Speeds



No. 2 CINCINNATI-ACME Universal Turret Lathe with Heavy Duty Turret Tools

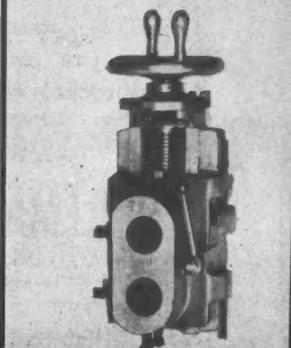
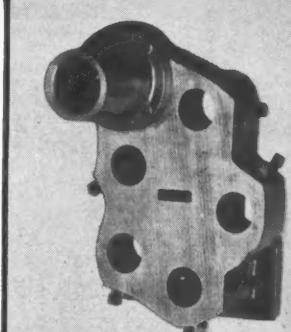
Here's a turret lathe designed to take heavier cuts at faster speed with cemented carbide cutting tools. The new heavy duty turret tools supported by 3" diameter stationary overhead pilot bar are designed to furnish maximum rigidity and accuracy.

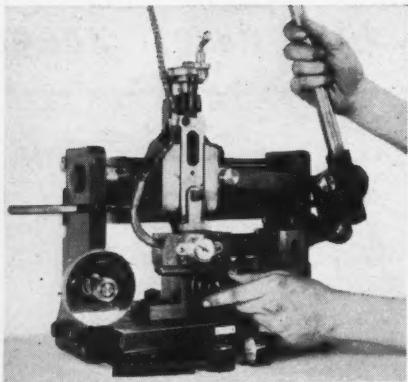
Multiple Turning Head—With reversible cutter holders available for the Multiple Turning Head, the turning range of all 3 holes overlap each other.

Slide Tool—The larger and heavier slide tool has a 6" diameter dial graduated in .001, stop screws and positive binder clamp.

Write for complete details.

THE ACME MACHINE TOOL CO.
CINCINNATI OHIO





Acromark No. 9H Marking Machine

tions and numbers or lettering passes over the mandrel at each forward and at each backward stroke of the operating lever. A roll of white, silver, or color transfer tape automatically feeds with the die, providing the filling for the marking. The die is electrically heated and has a heat control. A handy adjusting crank is used to regulate the

depth of the mark.

The machine without the electrical attachment can also be used for the cold marking of metal sleeves, cylinders, cups, caps, fuses, shells, and other parts.

Victory Manually-Driven Stud Setter

Developed especially to meet aeronautical requirements in stud setting, the Victory Manual Driven Stud Setter illustrated herewith has been brought out by the Titan Tool Co., Fairview, Pa. The tool is designed for the instant loading and releasing of studs, the register between tool and studs being obtained by a forward movement or thrust of the stud driver.

In the illustration, "View Open" shows the tool arranged to receive a stud. "View Closed" shows the driving jaws clamped tightly around the nut end of a stud, and the handles in a driving position. By clamping the driver to studs, studs are said to be protected against mutilated threads or bulged ends. In addition, the plating on the studs is said to be undisturbed.

Cullman SPROCKETS

A large stock of sprockets
always on hand for your
immediate needs.

Also Chains for all
Roller and Block
Sprockets in stock.

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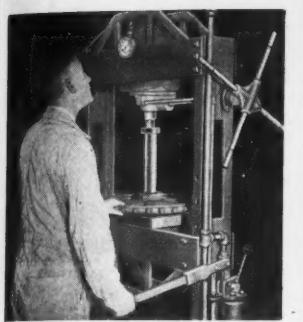


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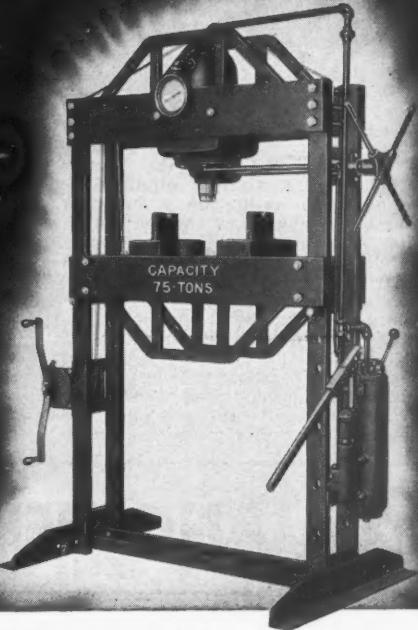
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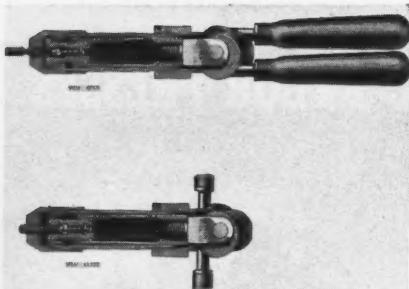
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City _____ State _____



Victory Manually-Driven Stud Setter

The clamping action of the Victory Stud Setter on a stud is obtained by means of cams acting on a drawbar. The cams are a part of the handle assembly. By reversing the position of the handles, the tool can be quickly released from the stud.

When a firmer driving grip on studs is desired, the cam head can be backed off slightly from the main ring, which action provides the desired adjustment. Jaws can be interchanged by moving the cam head forward to a point where the draw tube head can open into a recess provided for this purpose.

Armstrong No. 841 Gasket Material

A fibrated leather gasket material to be known as Armstrong No. 841 has been placed on the market by the Industrial Division of the Armstrong Cork Co., Lancaster, Pa. The material is recommended for sealing oil, water, or gasoline and for other general gasketing purposes wherever temperatures do not exceed 300 deg. F. and where acids or alkalies are not encountered.

Tough and tear-resistant, the material is supplied in rolls and sheets in standard widths up to 48 inches and is also available in shapes die-cut to specifications. It is compressible, has a high percentage of recovery, and takes a minimum amount of permanent set.

According to the manufacturer, Armstrong No. 841 is impervious to oil, water, gasoline, and other liquids. The material is also said to be subject to a minimum of dimensional or other physical changes due to moisture, dryness, or temperature variations.

Model RD-B6 Solu-Bridge

Designated as the Model RD-B6 Solu-Bridge, an instrument for use in checking pickling bath concentrations and

ANOTHER FEATURE OF

Hallowell

STEEL BENCHES

Pat'd. and Pat's. Pend.

Drawers are extra.

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA. BOX 556

BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO

is the many drawer combinations available. The model shown is popular in two-shift plants because each worker can keep his own tools safely under lock and key.

Write for catalog describing 1,367 styles and models in the famous "Hallowell" bench line . . . now!

STEEL BOXES

Immediate Shipment!



One - piece, all-welded construction. Hook handle at each end. Will nest perfectly when empty.

Each

TAPER PANS

No. 101—10"x18"x6"—18 Gauge, \$.75
No. 102—12"x20"x6"—16 Gauge, \$.90



Each

Straight Side

SHOP BOXES

No. 401—10"x16"x6"—18 Gauge, \$.85
No. 402—12"x18"x8"—16 Gauge, \$1.10



An ideal all-purpose shop box. Sturdy all-welded construction. Heavy skids act as a positive stacking lock and re-inforce box at point of maximum wear.

Each

STACKING BOXES

No. 601—10"x16"x6"—18 Gauge, \$.95
No. 602—12"x18"x8"—16 Gauge, \$1.25

Prices F. O. B. Factory, Philadelphia—Any Quantity!
Order Today—Write, Wire or Phone

AMERICAN METAL WORKS, INC.
1519 Germantown Avenue • Philadelphia, Pa.



INCREASE TOOL LIFE WITH PROPERLY PREPARED COOLANTS

You can save time, increase tool life and improve tooled surface finishes by preparing your soluble coolants and cutting compounds with a "LIGHTNIN" Mixer.

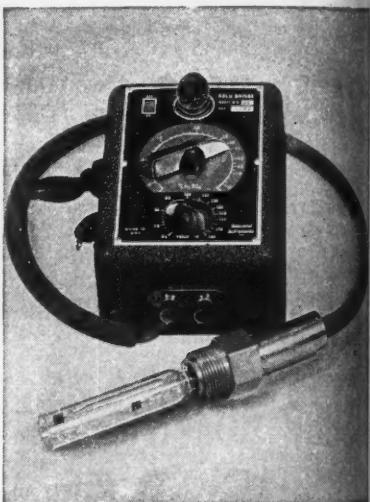
Whether you "make-up" for individual machines or have a central circulating or cooling system, a "LIGHTNIN" of the proper size and capacity is available to solve this problem for you. "LIGHTNIN" MIXERS CAN BE READILY CLAMPED ONTO ANY TANK OR VESSEL. They have been successfully used in large plants for mixing cutting oils for over twenty years!

Write for a catalog of "LIGHTNIN" Mixers. State the size of tank or tanks you use and the current available. Complete details will gladly be furnished.

MIXING EQUIPMENT CO., INC.
1048 GARSON AVE., ROCHESTER, N.Y.

similar solutions has been placed on the market by Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N.J. The instrument, which can be operated by any plant worker with speed and accuracy, is merely a rugged, simplified shop type Wheatstone bridge utilizing a "magic eye" as the indicator of balance and designed to measure the electrical conductivity of solutions in the desired terms.

Readings are obtained directly by turning a knob until the "magic eye" indicates balance. In the case of pickling solutions, readings are obtained in



Model RD-B6 Solu-Bridge

terms of sulphuric acid concentrations.

The Model RD-B6 Solu-Bridge is calibrated for 0 to 10 per cent as H_2SO_4 , with the scale arranged for easy reading in the range about 5 per cent. Other ranges of calibration in terms of different percentages of sulphuric acid, sodium hydroxide, or reciprocal ohms 10^{-6} are available on order.

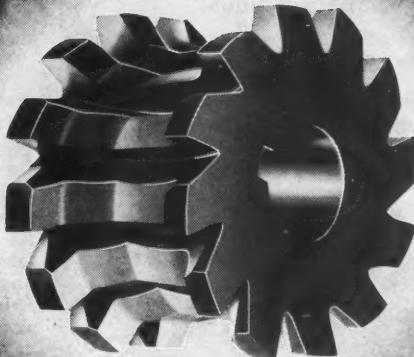
Electrical contact with a precise volume of the solution is established by means of a dip cell made of rubber with nickel electrodes, which is immersed in the bath only for a short time when readings are taken. If, for greatest convenience in taking frequent readings, it is desirable to have the conductivity cell remain constantly in the solution, a glass conductivity cell with platinum electrodes, which is mounted in a stain-



MECHANIZED AMERICA

deserves

the best



- SUPERIOR QUALITY
- EASIER SHARPENING
- LONGER LIFE

Falcon precision cutting tools provide greater economy by easy method of sharpening and guaranteed longer life. Also insuring sharper cutting edges in much less time.

We are in position to quote on Eccentric Relief cutters of the type shown above for reasonably prompt delivery. Send for illustrated information covering all types of cutting tools.

FALCON TOOL COMPANY

DETROIT, MICHIGAN

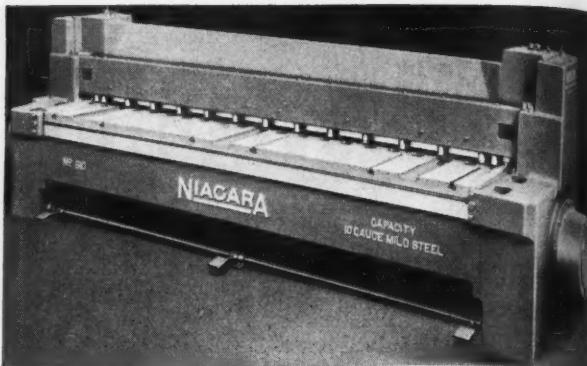
**Niagara Series No. 6
Power Squaring
Shear**

less steel sleeves that screws into a $\frac{3}{8}$ -inch pipe thread in the side of the tank, is recommended.

Since copper sulphate has a conductivity of only one-tenth that of sulphuric acid, the effect of copper sulphate proves negligible. The same check-up technique can be applied to many other industrial solution concentrations where the electrical conductivity can be translated into desired readings.

**Niagara Series No. 6 Power
Squaring Shear**

Designated as Series No. 6, a line of power squaring shears with capacities



from 12 gauge to $\frac{1}{8}$ inch and cutting lengths from 4 to 12 feet is announced by the Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, New York.

Designed for precision cutting, both as to straightness and parallelism, the Series No. 6 shear is equipped with a ball bearing, self-measuring, parallel back gage with settings to 1/128th inch. The machine operates at a speed of 6 strokes per minute and is designed for

SIMPLIFIED INTERNAL GRINDING with the MAJESTIC INTERNAL GRINDER



An exceptionally wide range of internal grinding jobs can be handled on the New Majestic Internal Grinder. Its simplicity of design and ease of operation are features of utmost importance in providing maximum grinding output at low cost.

S P E C I F I C A T I O N S

Length of table, 48". Swing over table, 10". Travel of cross slide, $2\frac{1}{2}$ ". Precision dial graduated to .0001". Precision bearing work head. Speeds — 100, 225, 350 r.p.m.

*Write for complete details contained
in New Bulletin*

Majestic Tool & Mfg. Co.
2950 E. Woodbridge Detroit, Mich.

THE DISTRIBUTOR

is the



ALLEN

gratefully acknowledges

the dependence of modern indus-

try on a strong body of Distributors,

serving as the sales agents of the manufac-

turer and the procurement agents of the consumer.

Only through such an institution can supply and demand be adjusted to the *known needs* of producers —

as only the local Distributor knows them.

THE ALLEN MANUFACTURING COMPANY

HARTFORD, CONNECTICUT, U. S. A.

the flat, straight shearing of narrow strips.

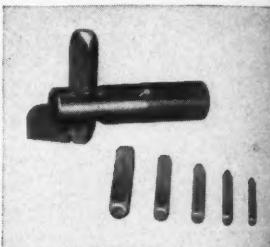
The drive, including flywheel, gearing, clutch, eccentrics, and connections, is enclosed and operates in oil. A direct-connected motor with starting switch is included as standard equipment of the shear.

"Safety" Adjustable Hand Toolholder

A "Safety" Adjustable Hand Toolholder designed for use in holding square or octagon shaped tools such as steel hand stamps, chisels, and similar hand tools has been announced by the M. E. Cunningham Co., 115 E. Carson St., Pittsburgh, Pa. The holder is adaptable for holding any size tool from $\frac{1}{4}$ to $\frac{3}{4}$ inch and other $\frac{1}{2}$ -inch ranges up to $1\frac{1}{4}$ inches square.

The Safety Adjustable Hand Toolholder provides a handy means for holding the different hand tools to eliminate possibility of split or smashed fingers caused by misdirected hammer blows. In addition, since the tool is held firmly in the holder, all possibility of the tool flying and causing injury to nearby

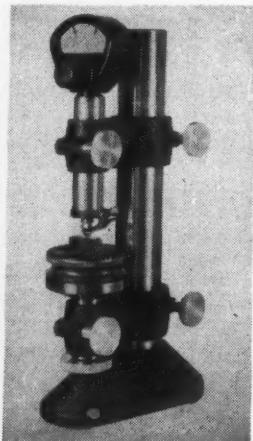
workers is said to be eliminated. By means of the holder, clear and even impressions with stamps can be readily obtained, since a stamp can be held



"Safety" Adjustable Hand Toolholder

squarely in place and, when necessary, struck hard so as to drive it deeply into the part being marked.

As shown in the accompanying illustration, the Safety Adjustable Hand Toolholder can be furnished with a leveler on the front end which is located at the proper angle to enable the user to make several impressions in a straight line. The holder is made from a piece of steel tubing having a V-



MIKROKATOR

"Mikro" (Minute)
Frictionless Amplification

Complete elimination of friction, lag, and backlash insures positive, dependable repeat readings. Pointer responds instantly to the slightest movement of measuring tip without swinging past the true reading. No waiting for pointer to come to rest.

No lights or electro magnets are used, as the amplification is 100% mechanical, thus eliminating a warming up period to permit the temperature of the instrument to become stabilized.

There are no electrical connections thereby enabling the instrument and stand to be readily moved about in the shop, for use in different locations.

Graduated—.0001" to .00001"

Graduated—.001 mm to .0002 mm

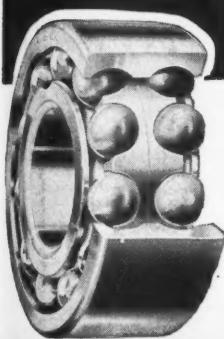
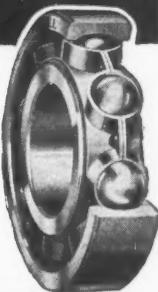
SWEDISH GAGE CO. of AMERICA
7310 WOODWARD DETROIT, MICH.

ted. By
even im-
e readily
be held

Bearings by MCGILL

Single Row

Single row ball bearings equipped with MCGILL bronze land riding retainers with cylindrical ball pockets.



PRECISION

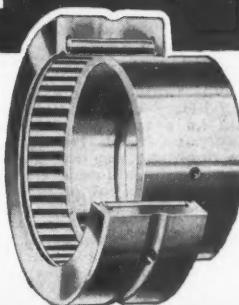
Maximum Capacity

Maximum capacity, double row ball bearings for greater combined radial and thrust loads. Two-piece MCGILL bronze retainer allows independent rotation of each row of balls.

BEARINGS

"Solidend" *MULTIROL*

"Solidend" *MULTIROL* full type roller bearing, held integral by outer race construction without end washers and retaining end rings.



Bearings
Division

MEGILL

MANUFACTURING CO.
1500 North Lafayette Street
VALPARAISO, INDIANA

WOODY SPENCER SAYS:
"THE RIGHT BLOW AT THE RIGHT
TIME WON A HEAVY WEIGHT
CROWN."



At Madison Square Garden—June, 1934, in the first round between Max Baer, the challenger and Prime Carnera, the champion—Carnera whipped three sharp lefts to Baer's mouth. Baer replied with a right that sent Carnera to the canvas. Although the fight continued to the 11th before Carnera murmured, "Fini," it is said he never fully recovered from this first paralyzing smash. For Baer—the right blow at the right time won a championship.

Strike a blow at low production. Make sure you are using the right tap for each tapping operation. The right tap at the right time means the difference between expensive, mediocre production and all out production at lower cost. To help select the right taps for your jobs, Wood & Spencer engineers are ready to serve manufacturers without obligation. Simply write us outlining your problem. The Wood & Spencer Co., 1920 E. 61st St., Cleveland, Ohio.

"The Right Tap at the Right Time"

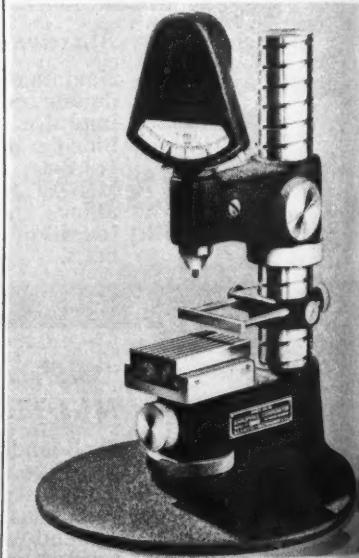
The WOOD & SPENCER Co.
Cleveland, Ohio

shaped hole through it near one end for holding tools. A special coil spring is inside of the tubing and is held in place by a backplate on one end of the tubing. A smaller piece of tubing is placed at the other end of the coil spring and a special vulcanized rubber plug is placed into the tubing. The spring provides tension against tools being held while the rubber provides the necessary friction to prevent the tools from flying out of the holder.

The Safety Adjustable Hand Tool holder is constructed to provide long service and is balanced and strengthened in the necessary places to eliminate any unusual wear.

Ames Amplifying Comparator No. 26

Manufactured by B. C. Ames Co., Waltham, Mass., the Ames Amplifying Comparator No. 26 shown herewith is



Ames Amplifying Comparator No. 26

intended for use in making comparisons of duplicate parts for size, indicating the most minute variations on a dial. Also capable of giving repeat readings, the comparator stands solidly on a large diameter base and is heavily con-

one end for
spring held in place
of the tub
ing is placed
spring and
er plug is
spring pro
being hel
e necessary
from flying

Hand Tool
provide long
d strength
es to elimi

parator

Ames Co
Amplifying
herewith is



Give your Taps a "BREAK" or they will **BREAK**

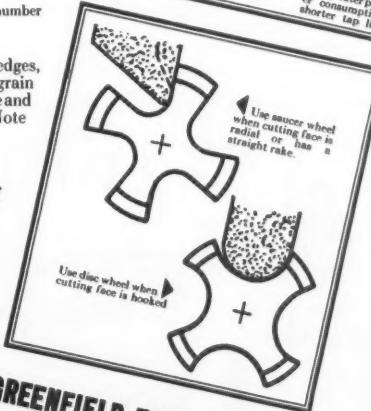
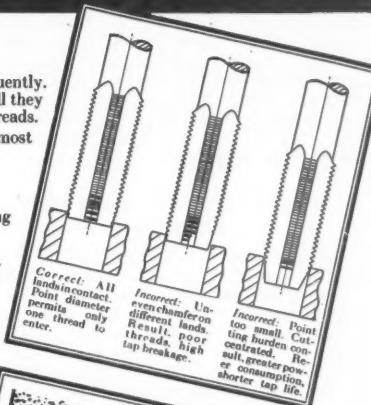
KEEP them in good condition by sharpening them frequently. Use dulls them as it does all cutting tools and when dull they are likely to chip, break and produce rough or oversize threads.

Here are some suggestions which will help you get utmost service from your taps:

1. The minute a tap begins to get dull, sharpen it.
2. Take light grinding cuts to avoid "burning" the cutting edges.
3. Use a tap chamfer grinding machine, if possible, as it reproduces the original grind accurately. There are several good ones on the market. If you must grind by hand, note the following:
 - a. As a rule, grind the chamfered portion only. (Note the diagrams which show correct results of grinding and—exaggerated—two common errors.)
 - b. Have a new tap handy for comparison regarding number of threads chamfered.
 - c. Use a soft 80 grain wheel.
4. If tap needs grinding in flute, to touch up the edges, use a universal grinding machine and a hard 60 grain wheel. Use a saucer wheel for a radial or straight rake and a disc wheel formed to the hook for a hooked rake. (Note the sketches which show how to handle this job.)
5. Completely grind away any broken teeth.
6. Polish the ground portion after sharpening if you are tapping soft or stringy materials that have a tendency to "load" the tap.
7. Taper Pipe Taps should always be machine ground and mechanically indexed to eliminate tapping out-of-round holes.

Remember that all taps become dull when in constant use. It takes more power to drive them and they often slow down the tapping machine resulting in lower production and excessive tap wear. *Keep your taps sharp.*

This is one of a series of advertisements published by Greenfield Tap & Die Corporation to help users get greater production from their small tools in these critical times, through making useful facts more widely known.



GREENFIELD TAP AND DIE CORPORATION
GREENFIELD • MASSACHUSETTS

DETROIT PLANT: 2102 West Fort St.
WAREHOUSES in New York, Chicago and Los Angeles

In Canada:
GREENFIELD TAP AND DIE CORP. OF CANADA, LTD., GALT, ONT.

GTD **GREENFIELD**
TAPS • DIES • GAGES • TWIST DRILLS • REAMERS • SCREW PLATES • PIPE TOOLS

structed to eliminate all spring.

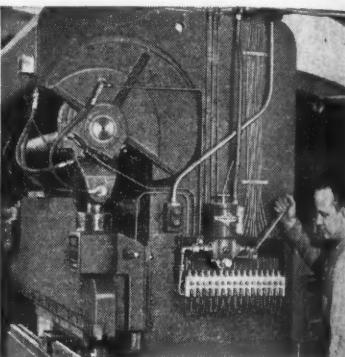
The cast iron base supports a steel upright column, which is grooved to accommodate an adjustable stop for the indicator bracket. Fine adjustment of the indicator is made by moving dial with outside lever. The adjustable stop assembly aids in locating work on the hardened and ground anvil.

Specifications of the Ames Amplifying Comparator No. 26 are as follows: total height, 15 inches; base diameter, 11 inches; total measuring capacity, 6 inches; fan head total range, 0.002 inch; distance from contact to front of post, $3\frac{1}{2}$ inches; anvils, $2\frac{1}{8}$ x $3\frac{1}{4}$ inches (special anvils to order); approximate weight, 40 pounds.

Lincoln "Centro-Matic" Lubricating System

Designed for all types of industrial machinery, a lubricating system to be known as the "Centro-Matic," is now being manufactured by the Lincoln Engineering Co., St. Louis, Mo. The system can be easily installed for lubricating all bearings. The system consists of a number of injectors—one for each bearing to be lubricated, each connected

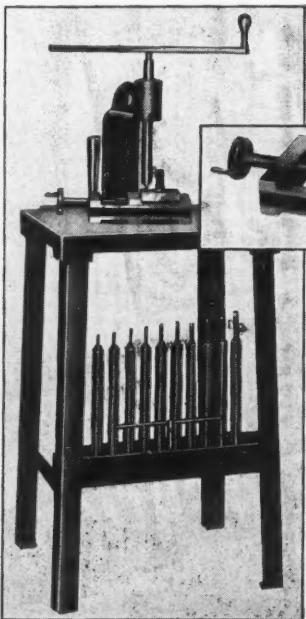
to the bearing by tubing or flexible high pressure hose as required, and each individually adjusted to discharge the re-



Lincoln "Centro-Matic" Lubricating System

quired amount of lubricant. The injectors can be mounted singly or in manifold and are supplied with lubricant from a central pumping unit.

An outstanding feature of the Lincoln



QUICK, ACCURATE HAND TAPPING BAY STATE Hand Tapper and Vise

An indispensable machine for your tool and die room to speed up work and improve quality—whether you tap 2 holes a day or 200.

FEATURES

Cuts direct hand-tapping labor costs on dies and fixtures 75%. • Requires no setting-up. Always ready. • Assures holes tapped at right angles without the aid of a square. Minimizes tap breakage. • Works more simply than tap wrench. • Does away with tap extensions. Spindle reaches down between projections. • Bay State Vise—most accurate hardened vise made—for Jig Borers and Surface Grinders. Many new features of design. • Write for folder.



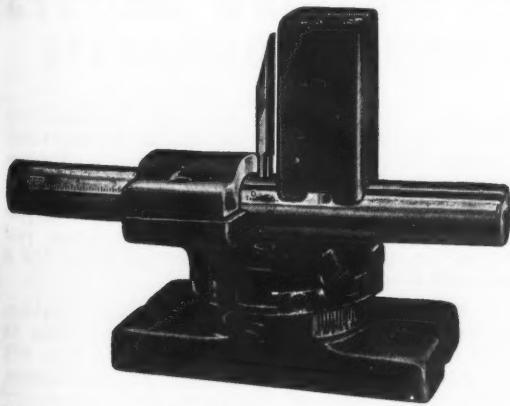
The Producto Machine Co.

990 Housatonic Ave., Bridgeport, Conn.
3017 Medbury Ave., Detroit, Michigan

Manufacturers and Distributors of
Producto Die Sets, Die Makers' Ac-
cessories, Dickerman Automatic Press
Feeds.

Accurate chaser grinding CUTS THREADING COSTS!

To users of self-opening die heads and collapsing taps, the Geometric Style E Universal Chaser Grinding Fixture brings savings through longer chaser life, the elimination of breakage and spoilage, and improved accuracy of work. Chasers that are correctly and uniformly sharpened long outlast dull chasers, and produce smooth, clean threads. This simple, compact, inexpensive fixture handles all types of conventional chasers—milled die head chasers, tapped die head chasers and collapsing tap chasers. Cut your threading costs and increase the efficiency of your threading tools with this universal grinding fixture.



*Send for
our booklet,
"For Longer
Lasting
Chasers."*

THE GEOMETRIC TOOL CO.
NEW HAVEN, CONN.

Centro-Matic Lubricating System is the single lubricant supply line between the pump unit and the Centro-Matic injectors. Additional features are the wide range of pumping units available and the varied types of control.

The pumping unit on the Centro-Matic installation illustrated is a 2-lb. Lincoln Centro-Matic Pump. The pump can easily be mounted directly on the machine. A few strokes of the handle deliver lubricant to all bearings. Other pumping units with 30-lb. capacity, as well as pumps that handle lubricants direct from 100 and 400-lb. capacity original drums, are also available.

The Lincoln Centro-Matic Lubricating System can be operated either electrically with push button control or entirely automatic with time clock control.

Lyon Workbench-Cabinet

Finished in durable Lyon Green baked enamel, a handy workbench-cabinet has been placed on the market by Lyon Metal Products, Inc., 3074 Clark St., Aurora, Ill. The 12 square feet of enclosed storage area of the unit are protected by full swinging triple latch doors equipped with padlock hasp or built-in

flat key lock. The center shelf is adjustable on 1½-inch centers.

The heavy gauge working surface



Lyon Workbench-Cabinet

the cabinet is said to be ideal for vises and grinders.

Black & Decker Heavy Duty "Holgun"

To meet the demand for a still more powerful $\frac{1}{4}$ -inch drill than its standard "Holgun," the Black & Decker Mfg. Co.

2 STANDARD BUSHING GROUPS REDUCE SPECIAL REQUIREMENTS



★ Yes, when you buy your jig bushings from Acme, you get an extra standard line to select from because Acme can furnish A.S.A. (American Standards Ass'n.), plus Acme standard bushings.

Where only A.S.A. bushings are available, your requirements may be special. But, at Acme, your A.S.A. "special" may be listed in the Acme line of standard bushings.

So, for the largest line of standard bushings available, see what Acme has to offer. Write for your FREE Acme catalog today. It will help with the selection of bushings for your jigs and fixtures.



ACME INDUSTRIAL COMPANY

Specialists in Flat and Cylindrical Lapping

212 N. Laflin St.

Chicago, Ill.

MONroe 4122

shelf is 4
surface



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UPS
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uary, 1942



MIDWEST MILLING CUTTERS AND HOW BEST TO USE THEM

HEAVY DUTY PLAIN MILLING CUTTERS—This type of cutter is recommended where there is heavy production milling of materials in soft or alloy steel, bronze or copper. They have coarse pitch, undercut teeth with maximum backing behind cutting edges and ample chip space.

Midwest standard heavy duty mills have a smooth cutting action; they set up an end thrust which keeps the spindle tight in its bearings and eliminates chatter because they are made with 45° left-hand spiral teeth.

HALF SIDE MILLING CUTTERS—a type for heavy-duty straddle milling operations where only one side of the cutter is required for milling; also used frequently in pairs to mill a slot to fixed width but where finish at bottom is not important.

These mills have spiral, undercut teeth which provide particularly free-cutting action. Compared with side milling cutters, these half side mills show lower power consumption, more pieces per grind, and less idle machine time due to cutter changes.

STAGGERED TOOTH SIDE MILLING CUTTERS—This type of mill is exceptionally free cutting. For that reason it is ideal for deep slotting or the milling of keyways. The top teeth are undercut and have an alternate right and left-hand helix angle, which greatly reduces end thrust.

Since drag ends (inefficient tooth portions) are eliminated, increased chip room is obtained, and chip lengths are broken up, giving them the characteristic snap out of the cut. The sides of the teeth having no cutting action are "dished"

slightly toward the recessed part of the cutter and this eliminates "bugging" of the cutter sides and, in turn, scoring the sides of the slot.

Many other types and forms of metal cutting tools are made by Midwest; catalog No. 17 contains illustrations and extensive information on them.

Any metal cutting problem inquiry you make will be carefully studied and analyzed. Suggestions and recommendations will be returned to you on types of tools to employ and how best to use them—a Midwest service entering its 31st year.

MIDWEST TOOL & MFG. CO.
2366 W. Jefferson Ave.

Detroit, Mich.



END MILLS • SLEEVES • COUNTERBORES • DRILLS
SPECIAL TOOLS • REAMERS • FORM TOOLS
CARBIDE TIPPED TOOLS • ADJUSTABLE HOLDERS

Precision METAL CUTTING TOOLS



ROGERS REAMERS

SINCE 1885



Fig. 26

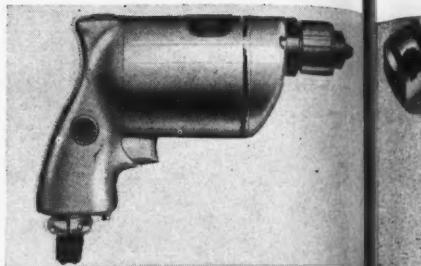
High Speed Blades. Adjustable for Wear. Deliveries Good.

JOHN M. ROGERS TOOL CORP.
GLOUCESTER CITY

NEW JERSEY



Fig. 8



Black & Decker Heavy Duty End Handle "Holgun"

600 E. Pennsylvania Ave., Baltimore Md., is now marketing a heavy duty "Holgun" which is said to have 50 per cent more power than the standard unit.



Black & Decker Heavy Duty Side Handle "Holgun"

Designed especially for use in aircraft and kindred industries, the Black & Decker Heavy Duty Holgun is offered in four models; namely, standard speed

GEARS

Good Gears Only

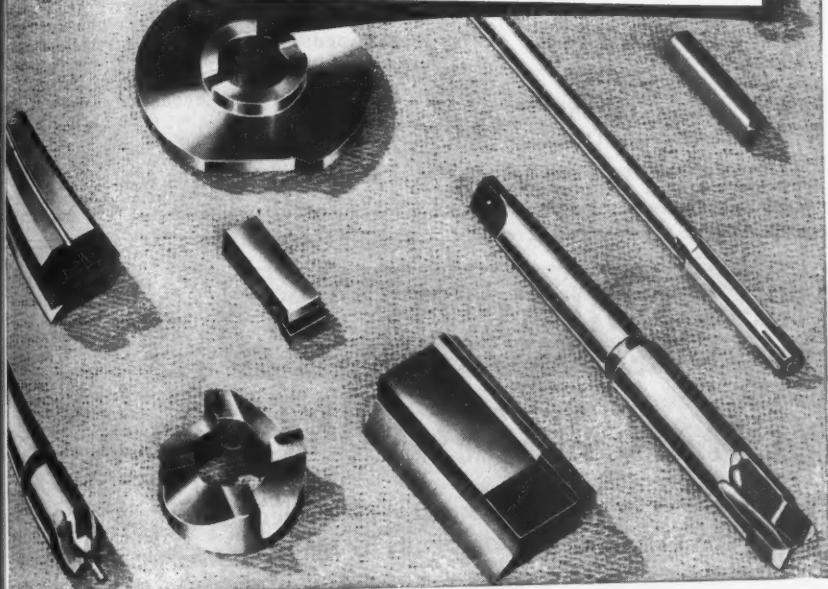
All Kinds
Any Quantity
AT THE RIGHT PRICE

THE CINCINNATI GEAR CO.
1825 Reading Road
Cincinnati, Ohio

"Buy from Super"

is an increasingly common request found on Requisitions for Carbide Tipped Special Tools in many busy Defense Plants.

They know they can depend upon the accuracy and outstanding quality of Super Special Tools.



SUPER TOOL CO.

21640 HOOVER RD.

DETROIT, MICH.



CARBIDE TIPPED TOOLS

FOR TURNING - FACING - REAMING - SPOTFACING - BROACHING
FORMING - GRINDER RESTS - WEAR PARTS - BORING - MILLING - DRILLING
GROOVING - COUNTERBORING - SHAVING - CENTERS - SPECIAL PURPOSES

uty End

Baltimore
heavy duty
have 50 per
standard unit

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in aircraft
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Only

AR 00.
Cincinnati, Ohio

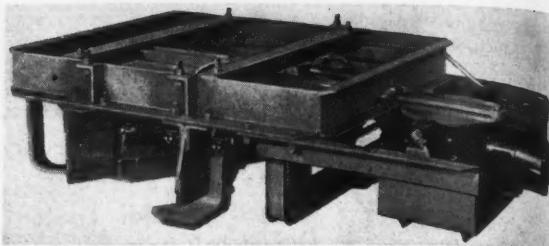
February, 1942

end handle model, low speed end handle model, standard speed side handle model, and low speed side handle model.

The standard speed end handle model weighs only 60 ounces and is $7\frac{1}{4}$ inches long. All models have two-pole instant-release switches with Black & Decker "Pistol Grip and Trigger Switch" control, suited to either right or left-hand operation. Each unit is powered by a universal motor and is ball bearing equipped throughout, thereby making it especially suited to constant duty $\frac{1}{4}$ -inch production drilling.

Cleveland Tramrail Type H Motor-Driven Track Switch

Designated as the Type H, an electrically-operated motor-driven track switch has been developed by the Cleve-



Cleveland Tramrail Type H Motor-Driven Track Switch

land Tramrail Division of The Cleveland Crane & Engineering Co., Wickliffe, Ohio, for use on cab-operated, gravity or automatic dispatch overhead materials handling systems. The switch is designed so that the Tramrail operator can preset it at some distance ahead while traveling and thus save time lost when switching by hand. Likewise, indexes on gravity or automatic dispatch carriers may be set to actuate trippers which will cause one or several switches to take the positions desired.

The Type H switch is ruggedly constructed of welded steel. It consists of

USE INDUSTRIAL BAGS to MAIL SMALL PARTS!

Victory won't wait for slow delivery! Speed small parts to war production plants by mail . . . by airmail . . . in cotton bags. The cost is low, the speed is great, and packing time and labor are cut up to 90 per cent.

Use bags to tie parts to products, to mail small parts economically and to mail samples right with letters. Order suppliers to use them in shipping to you. Drop a line for FREE samples and full information.



"Efficient as
a Zipper!"

amesacks

AMES BAG CO.
CLEVELAND

COTTON SACKS
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AMES BAG MACHINE CO.
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LAPPING MAGIC COMES IN THE CLOVER CAN

Through the use of 40 million cans over a period of 38 years, mechanics have found Clover Grinding and Lapping Compound one of the most valuable tools in metal finishing.

Clover Compound means precision in lapping,—precision made possible by careful control over every step of its production, from the selection and perfect grading of the super-sharp, diamond-hard Silicon Carbide abrasive grain, down to the uniform blending of the grain with the especially processed, heat-resisting hard oil binder.

Your distributor can supply you with a grade of Clover Compound exactly right for your every job. Accept no substitutes. CLOVER MFG. CO., NORWALK, CONN.

In the Green Can—Famous for 38 Years

CLOVER

GRINDING AND LAPPING
Compound

In the Green Can—Famous for 38 Years

February, 1942

MODERN MACHINE SHOP 245



CHECK THESE CLOVER QUALITIES!

Super-sharp, diamond-hard Silicon Carbide grain—non magnetic; eight grades from microscopic fine to very coarse.

Special petroleum hard oil binder—maintains uniform consistency and grain suspension during lapping operation.

Fast-cutting, cool-cutting—does not burn or score work.

Non-corrosive—does not affect work or operator.

Keeps mechanical mixture—withstands unusual friction temperatures.

ASK US ALSO ABOUT CLOVER COATED ABRASIVES

Supplied in sheets, rolls, belts, discs, sleeves and other shapes in Aluminum Oxide, Silicon Carbide and Emery, as well as Garnet and Flint; in paper, cloth and combination backings. There is a Clover Coated Abrasive at the right price for your every sanding need. See your distributor; or write us direct. Ask also for informative Abrasive Manual, and for free working samples. Address DEPT. R.



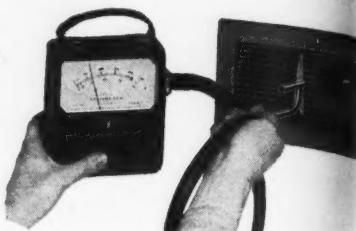
two main assemblies; namely, an outer supporting frame and an inner sliding frame. The outer frame is designed for bolting rigidly to the super-structure. The inner assembly, carrying a straight and a curved rail, rides on multiple easy-operating rollers and is set in position by a motor-driven cam through a lever arrangement.

Systems employing Cleveland Tram-rail Motor-Driven Track Switches can be furnished to suit practically every materials handling requirement.

Air Intake or Exhaust Grille Jet for "Alnor" Velometer

Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago, Ill., is now offering an air intake or exhaust grille jet designed for use with its "Alnor" Velometer (air velocity meter). The jet has two calibrated air intake openings. One of the openings is at the end of the main member. This member forms a compensating tube and extends from the grille face outward from or beyond the critical suction zone; that is, the zone where the air pressure changes most rapidly from static to velocity.

At right angles to the main member is a branch tube, also calibrated, to which is attached the flexible tube connecting



Air Intake or Exhaust Grille Jet in Use with "Alnor" Velometer

the jet to the Velometer. The air entering the Velometer movement is aspirated through the branch tube by the force of the suction exerted upon the main member or compensating tube.

The jet is offered in two sizes—low velocity of $\frac{1}{8}$ -inch O.D. tubing for full scale ranges of 0 to 1,000 f.p.m., and high velocity of $\frac{1}{8}$ -inch O.D. tubing for scale ranges of 0 to 2,500 feet per minute and higher.

INSTANTLY CENTERS AND CLAMPS ANY SIZE BORING BAR

*without disturbing
alignment of the Bar
Holder!*



BOILING
BARS
•
BOILING
BAR
HOLDERS

B&W MANUFACTURING CO. • 3216 DOUBLE DRIVE, EL MONTE, CALIF.

• The B & W Bar Holder automatically holds any size boring bar on the center line of the lathe. A separate nut clamps the body of the holder in alignment and need not be loosened in changing or adjusting bars. Bars have $\frac{1}{4}$ " graduations on both ends. Holders and bars in all sizes. Write for literature.

B & W

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Here's HOW to SAVE

- Up to $2\frac{1}{2}$ Production Hours
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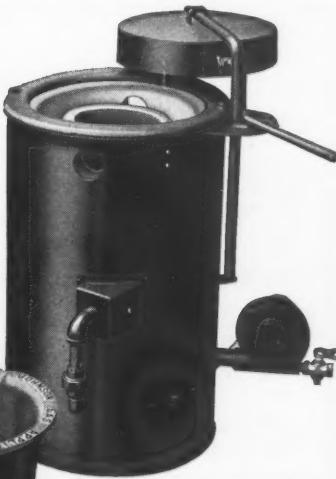
JOHNSON FURNACES for INDUSTRY

FOR MORE THAN 40 YEARS



No. 130 High Speed Steel Heat-Treating
Furnace Gives 2300° F. in 22 Minutes

Produces quick, accurate, high temperatures for treating hi-speed steels. Has G.E. Motor and extra large Johnson Blower. Firebox size, 13" x 13½" x 5", heavily lined with insulating refractory. Write for Catalog. \$260* for furnace, F.O.B. Factory. Available in other sizes, and built to your specifications.



No. 550 (Right)
POT HARDENING
AND MELTING
FURNACE

For economical salt, cyanide and lead hardening, and for melting aluminum and nickel silver. With 8" x 10" steel pot, \$125* F.O.B. Factory. Available with other pot sizes.

*Prices subject to change without notice.

JOHNSON GAS APPLIANCE CO.
362 E Ave. N.W., Cedar Rapids, Iowa.
Please send me Free new Johnson
Catalog.

Name _____

Address _____

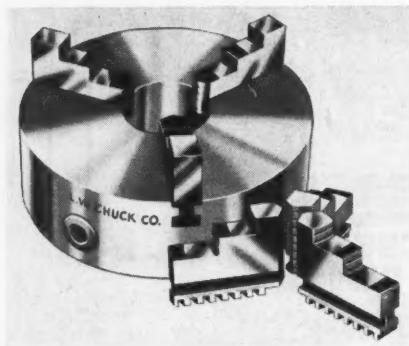
City _____ State _____

Sales Offices:

Bourse Building, Philadelphia.
120 Liberty St., New York City.
C. B. Babcock Co.
475 11th St., San Francisco.

L-W 3-Jaw Universal Lathe Chuck

A 3-jaw universal lathe chuck adaptable for either light or heavy duty work



L-W 3-Jaw Universal Lathe Chuck

has been brought out by the L-W Chuck Co., 20 N. St. Clair St., Toledo, Ohio.

The body of the chuck is a semi-steel casting, ruggedly designed for maximum strength. Jaws are hardened and ground

steel and are accurately fitted. A set of reversible jaws is also furnished. Scroll and pinions are made of high grade steel, accurately cut.

The chuck, which is designed for either lathe or screw machine work, is supplied complete with T-handle wrench.

Littelfuse Spare Fuse Holder & Puller

A device for changing fuses in close quarters, to be known as the Littelfuse Spare Fuse Holder and Puller, has been announced by Littelfuse, Inc., 4797 Ravenswood Ave., Chicago, Ill. The device is applicable to all 4 A G and 5 A G fuses.

As shown in the illustration, the fuse in circuit fits through one end of the soft rubber rectangular Littelfuse Holder between clips. Above and at right angles to this fuse is an opening in the holder for a spare fuse. When inserted, the caps of the spare fuse project beyond the holder, providing an easy grip for two fingers.

When the fuse in circuit blows, the operator simply pulls and reverses the Littelfuse Holder. This places the spare



MODEL AA

\$99.50

Write for details
of This and Other
Carbide Grinders

Prosser CARBIDE TOOL GRINDER

Removes metal fast when
rough grinding.

Finish grinds smooth, keen
cutting edges.

Oversize 7" wheels give great-
ly increased wheel life.

This grinder will quickly pay
for itself by increased tool per-
formance and life between grinds.



THOMAS PROSSER & SON
120 WALL STREET NEW YORK

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How the Greater Hardness of KENNAMETAL

INCREASES PRODUCTION
REDUCES TOOL COSTS

THE Rockwell hardness of a tool material is not a complete indication of its ability to resist wear. A KENNAMETAL tool tip of the same Rockwell hardness as another carbide will actually machine more pieces per tool grind and last longer because of the greater hardness of the individual particles of tungsten-titanium carbide in the tip. This has been proven by comparative tests on jobs in production.

Here is what the greater hardness of KENNAMETAL means to users of turning, boring and facing tools for machining steel parts:

LESS DOWN TIME FOR REPLACING DULL TOOLS

Lathes and boring mills are kept productive during longer periods of time.

LESS TIME FOR GRINDING TOOLS

Eases the burden on men and machines in the grinding department.

LESS TOOL INVENTORY

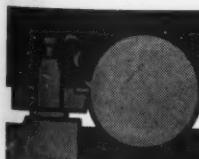
Fewer tools needed to replace dull tools and tools which have worn out.



RECORD SALES PERMIT PRICE REDUCTION

Despite the fact that KENNAMETAL is harder, stronger, and more "crater-resisting" than other steel-cutting carbides, it costs no more. You need pay no extra to use the best. Write for Price List No. 7 containing new low prices on KENNAMETAL tools and blanks, effective Jan. 5, 1942. Do you have our Catalog No. 42?

SALES REPRESENTATIVES FROM COAST TO COAST



MCKENNA METALS Co.

300 LLOYD AVE., LATROBE, PA.

Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York
Exclusive of Canada and Great Britain

Canadian Representatives: Kennametal Tools & Mfg. Co., Ltd., 24 Dunbar Ave., Hamilton, Ont.



"TRUMORE" DIAMONDS

*Truly Economical for
Truing Grinding Wheels*

Sectional view of
long, natural dia-
mond.

Never wears dull.
Requires no reset-
ting.

Furnished in any
type of mounting
desired.

(Norton Hex. shown)

Diamond held se-
curely in special
nickel alloy.

Write for Circular. Price
for complete tool: $\frac{1}{2}$ carat
\$3.50, $\frac{1}{2}$ carat \$7.50, 1
carat \$22.00. All sizes up
to 5 carats in stock. Immediate shipment.

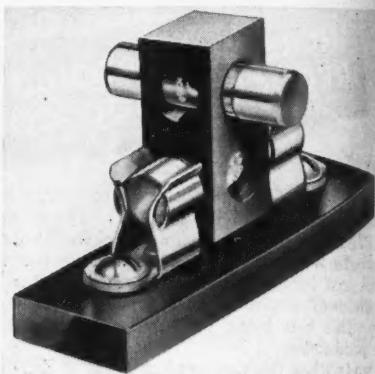


F. F. GILMORE & CO.
112 DARTMOUTH ST. • BOSTON, MASS.

**Diamond
Importers and Toolmakers**

fuse in circuit and brings the blown
fuse on top in the same position previ-
ously occupied by the spare fuse. The
change is made easily and quickly.

One end of the Littelfuse Holder and
Puller is painted red. Until a fuse
change is necessary, the red end is un-
derneath, out of sight. When a reverse
is made, putting the space fuse in
circuit, the red end is brought into full
view on top. To an inspector or service
man, this red signal instantly indicates
that a fuse has blown and that another



Littelfuse Spare Fuse Holder & Puller

spare is required. If the end is black,
both the fuse in circuit and the spare
are still serviceable. Fuses can be
easily removed and replaced. "Win-
dows" in the unit keep the elements of
both fuses in view at all times.

The Littelfuse Spare Fuse Holder and
Puller is made in two sizes; namely,
No. 1422, $\frac{1}{4} \times \frac{1}{2} \times 1\frac{1}{8}$ inches, for 4 A G
fuses, and No. 1378, $\frac{5}{8} \times \frac{5}{8} \times 1\frac{1}{8}$ inches,
for 5 A G fuses.

Acromark Inspector's Symbol Stamps

A line of inspectors' symbol stamps
each having a different symbol is now
being marketed by The Acromark Corp.,
251-257 N. Broad St., Elizabeth, N. J.
The stamps, which are available with
100 different symbols, are designed to
produce sharp and distinct markings.
Each stamp is individually engraved in
the Acromark "Heavy Duty" manner
for severe service, and is tapered to the
symbol so as to facilitate location of the

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6x14 ft.

Despite its gigantic size, this surface plate (like all its smaller counterparts) exemplifies precision of a very high degree, over every inch of the surface from the center to the very edge.

Built of Meehanite — a specially processed iron recognized for its strength, uniform texture, and solidity through all sections. The design of this plate will prevent distortion or changes after once being scraped. All our plates resist deflection under reasonable load and retain their accuracy, due to the special form of ribbing that supports them. Ample clamping space is provided all around the edges.

Sizes range from this large fellow illustrated above, 72 x 168 inches, down to 10 x 15 inches.

To keep plate level and flat, we have developed a specially constructed standard provided with unique supports. Locked to a fixed position these supports are designed to withstand vibration.

Send for complete folder describing sizes and quoting prices.

MACHINE PRODUCTS CORPORATION

6773 E. McNichols Road

Detroit, Mich.



Acromark Inspectors' Symbol Stamps

symbol in stamping.

Ordinarily, a differently symbolled stamp is used by each inspector. However, where several inspectors use the same symbol for the same operations but in different shifts, the stamps can be made to include a number in the symbol. To eliminate the possibility of marking symbols wrong side up as well as to assist in classifying stamps, each stamp has a symbol identification number and the size marked on the front.

Since many inspectors like to carry their stamp in a vest pocket when not

in use, Acromark Symbol Stamps are not furnished in boxes unless desired, in which case boxes to hold any number of stamps can be supplied at an additional charge.

Gisholt Double End Boring Bar

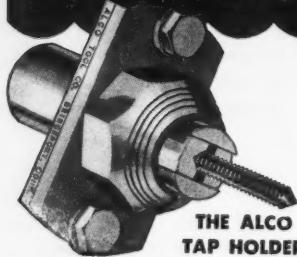
A double end boring bar for use with saddle type turret lathes has been announced by the Gisholt Machine Co., 1219 E. Washington Ave., Madison, Wis. The bar is designed to fit into the standard flanged toolholder on the tur-



Gisholt Double End Boring Bar

ret, then through the turret, and is held on the opposite side by a short holder having four screws to firmly grip the bar. This makes an extremely rigid bar with large single point cutters for use with cross feeding turret.

Full Speed ahead-



THE ALCO
TAP HOLDER

Army and Navy, Industry and Labor—all must be keyed up for *full speed ahead* production. Alco Tap Holders give *full speed, plus*. Eliminates bushings—easily adjusted—concentric alignment—saves broken taps—saves time in changing from one tap size to another—longer tap life.

Designed for speed, efficiency and economy—designed for VICTORY.

WRITE FOR CATALOG.

THE ALCO TOOL CO.

835 Housatonic Ave.,
Detroit Office: 908 Stephenson Bldg.

Bridgeport, Conn.
February, 1947

ALCO TOOLS
EFFICIENT

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February, 1942

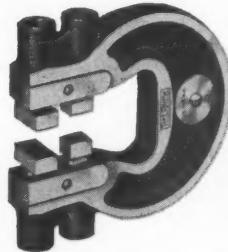
U. S. Inspectors of Armament Production ***



LIMIT RING THREAD GAGES



LIMIT PLUG THREAD GAGES



ADJUSTABLE THREAD SNAP GAGES

TAFT-PEIRCE THREAD GAGES

YEARS AGO, the first educational shell orders called up for service the Taft-Peirce line of Thread Gages. Since then, the Taft-Peirce Thread Gage Department has doubled, redoubled — now reaches a size where it has had to be moved into a six-story plant of its own, adjacent to the main plant.

Here, production shifts into higher speed than ever, assuring prompt service on the complete Taft-Peirce Thread Gage line, which includes all AGD Standards and many special types. This line is shown in the Taft-Peirce Handbook. A line on your letterhead brings a copy to your desk. The Taft-Peirce Manufacturing Company, Woonsocket, Rhode Island.



USE TAFT-PEIRCE GAGES
for every gaging need



Haskins Flexible Shaft Machine Type HS-7

Haskins Flexible Shaft Machines Type HS-7

R. G. Haskins Co., 619 S. California Ave., Chicago, Ill., announces that its heavy duty truck-mounted flexible shaft machines Type HS-7 are now being supplied complete with semi-pneumatic rubber tires on the truck wheels, as shown in the accompanying illustration. A

bulletin giving further information is available upon request.

Exola Fast Penetrating Rust Solvent

Guaranteed to loosen rusted and corroded parts of all and every combination of metals regardless of how badly frozen together, a fast penetrating rust solvent, to be known as Exola, has been announced by Patrick-McDermott & Co., 2706-8 S. Hill St., Los Angeles, Cal. By combining chemically with rust or corrosion, Exola is said to form a metal stearate similar to grease which immediately loosens all metal parts to which it is applied, yet is harmless to the metals themselves.

Exola Rust Solvent is available in pint, quart, and gallon containers and 30 and 50-gallon drums.

Paddock Ball Bearing Band Saw Guides

Recommended for use on band saw machines operating at any speed in production work and in the cutting of all

Pullmore Clutches
... Ideal Lift Control for Industrial Trucks

Pullmore Clutches are ideal for machine tools, too, and packaging machines, spring coilers, fire equipment, cranes, hoists... any machine where a compact, powerful, efficient clutch is needed. They are smooth-running, easy to operate, durable; unexcelled in either main or auxiliary drives as a clutch, brake, double clutch, or clutch and brake.

In the Tractor illustrated a Single-Type Pullmore controls the hydraulic lift; providing high efficiency and economical long life for frequent operation required in this service. Pullmores are made also in Double-Type; and in many capacities from 1 to 75 h.p. at 500 r.p.m., for operation in oil or dry. Their engagement is not affected by centrifugal force.

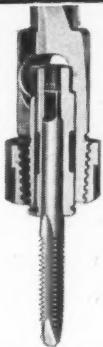
Manufacturers in varied lines have found Pullmore Clutches a money-saving convenience in designing and manufacturing; and assurance of unexcelled operating satisfaction. Look into advantages for your products. Information on request. Pullmore Clutches are sold by Morse Chain Co., Ithaca, N. Y., offices in principal cities.

Rockford Drilling Machine Division Borg-Warner
300 Catherine Street, Rockford, Illinois, U. S. A. Corporation

Over-Center Clutches • Spring-Loaded Clutches • Pullmore Clutches

Better TAPPING at LESS COST

... made possible by Many Basic Improvements in Procunier Tapping Heads



Cross section of Tru-Grip Tap Holder showing positive drive to tap.

A prominent Ohio manufacturer writes: "On checking with our factory, I find the PROCUNIER HIGH-SPEED TAPPING HEAD WITH THE TRU-GRIP TAP HOLDER not only eliminates the necessity for using extension taps, but it reduces tap breakage . . . and enables our workmen to produce more and better work." Here's why: Tru-Grip tap holders weigh less than $\frac{1}{3}$ the weight of conventional tap holders, and are more compact and accurate. Only Procunier High-Speed Tapping Heads offer all these features: Dry, double-cone friction clutch that won't wear and can't absorb oil; makes bottom tapping easy; ball bearings; three point balanced, heat-treated gear reversing mechanism, which distributes pull and greatly reduces strain — and other important features.

SEND FOR BULLETIN

giving full details, description and prices on complete line of Procunier Precision Tapping Heads to meet all needs, the new Tru-Grip Tap Holder — and also the full line of Procunier Universal Tapping Machines, hand, foot or air-operated.

Procunier Safety Chuck Co.
12 S. Clinton St.
Chicago, Illinois

Send me bulletins on: High Speed Tapping Heads
 Tru-Grip Tap Holders Universal Tapping Machines

Name _____

Address _____

City _____

State _____

SAFETY CHUCK CO.

12 S. CLINTON ST.
CHICAGO, ILLINOIS

PROCUNIER

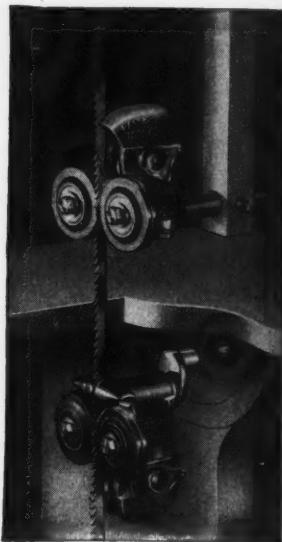


SUTTON Feeders with long-life spring tension and Sutton diamond-serrated Collets with their surer grip under less tension make screw machines live longer and cut down spoilage from slipping. Ask for Sutton Catalog with complete listings.

SUTTON TOOL COMPANY
2895 W. Grand Blvd. • Detroit, Mich.
Accessories for Screw Machines

kinds of materials, band saw guides which support blade through the use of interchangeable high carbon alloy steel ball bearing wheels, are now being manufactured by The Paddock Tool Co., 111 Walnut St., Kansas City, Mo. The V-shaped groove in the thrust wheels hold the back of the blade while the two front wheels provide support to the sides of the blade, thus ensuring accurate operation under all conditions.

The frictionless support afforded by



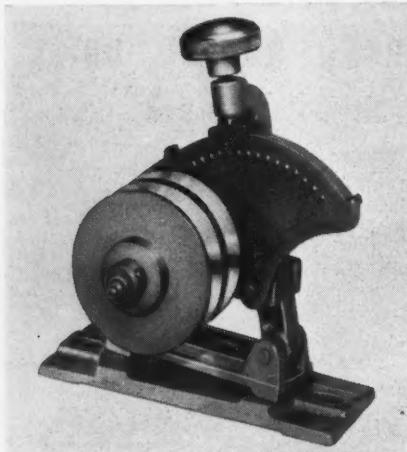
Paddock Ball Bearing Band Saw Guides

the wheels, all of which travel with the blade, is said to prevent any tendency toward heating or crystallizing, thereby reducing blade breakage to a minimum. Double sealed bearings prevent the entrance of dirt or the escape of lubricant.

Paddock Ball Bearing Band Saw Guides can be easily adjusted to accommodate blades from $\frac{1}{8}$ to $\frac{1}{4}$ inch wide, and are available in two models for attaching to different types of machines.

"JFS-Cub" Variable Speed Transmission

A V-belt variable speed transmission to be known as the "JFS-Cub" has been introduced by the Standard Transmission Equipment Co., 416 W. 8th St., Los



"JFS-Cub" Variable Speed Transmission

Angeles, Cal. The transmission is especially designed for all "A" section V-belt applications and for speed ranges up to 3.3 to 1.

Features of the JFS-Cub include a positive belt alignment feature which

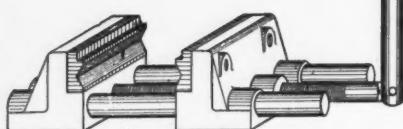
enables the unit to be mounted in any position without impairing function or throwing belts out of alignment; machined and balanced cast iron construction; smooth-sided pulleys; forced lubrication of the special bronze bearings on which the pulleys rotate, and free-end pulley spindle to permit easy installation of belts. In addition, both pulleys of the transmission are located on one side of the pivotal mechanism, thus permitting motor pulley and driven pulley to be situated almost directly in line with each other.

The JFS-Cub Variable Speed Transmission has a shipping weight of 12 lb. and is supplied complete and ready for immediate installation.

Bargar Fabricated Sheet Steel Machinery Guards

A line of fabricated sheet steel machinery guards is now being marketed by the Bargar Sheet Metal Co., Cleveland, Ohio. The guards are produced by means of special welding and forming processes that give the guards a streamlined design which from the outside appears seamless.

JOHNSON 3-WAY DRILL VISE



Jaws 5" wide, hardened, reversible, open 5". Holds round, square and flat shapes. Vise usable 3 ways. Write for folder.

Price \$15.50

Send orders now for early deliveries.

"Mold Your Own" LEAD HAMMERS

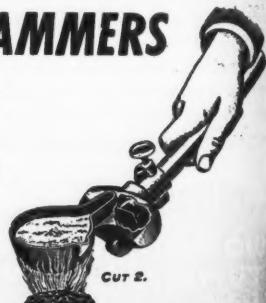
with this Lead Hammer Mold. Casts hammer heads over pipe or "Shur-Grip" malleable iron handles.

Also: Bench Vise Jaw Mold—for lead vise jaws.

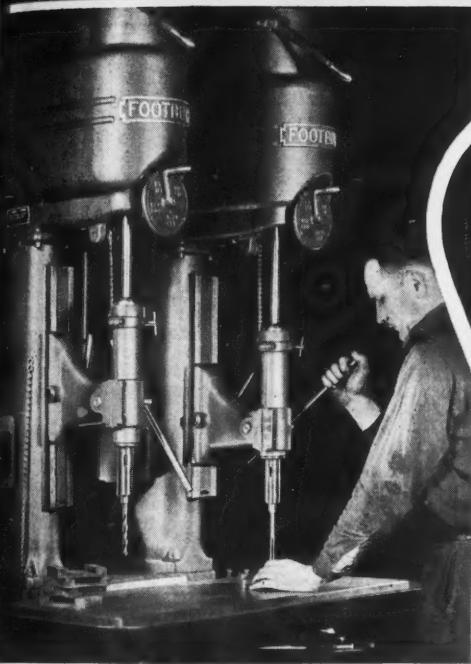
Lead Hammers—all sizes in stock.

Write for Circulars and Prices

JOHNSON TOOL CO., Inc.
MASSASOIT AVE. EAST PROVIDENCE, R. I.



For Production or Tool Room Drilling



Built sturdy for continuous production work yet with accuracy for the finest toolroom work, Footburn sensitives are all around favorites for small hole drilling. The wide speed range with backgear units from 185 to 2300 or from 277 to 3400 RPM makes it adaptable for drilling small holes in brass or aluminum or for

counterboring holes up to $1\frac{1}{16}$ " in tool steel.

We are still able to quote early deliveries on some sizes. Just write or phone for full information.

THE FOOTE-BURT COMPANY
CLEVELAND, OHIO

Detroit Office: 4-233 General Motors Bldg.

FOOTBURT

Sensitive
DRILLING MACHINES

ANNOUNCING
A NEW, FAST
KIPP
Air
GRINDER



- HANDIER GRIP
- MORE POWER
- 50,000 R.P.M.

Madison-Kipp tool-makers originated the first really high speed grinder. They know a great deal about the practical side of grinder design and grinder usage. They think the new Model H is the best all around off-hand tool they have ever tried and we are sure you will agree with them.

Order Today! **ONLY \$29⁷⁵**
Please attach preference rating certificate with order.

MADISON-KIPP CORPORATION
208 WAUBESA ST., MADISON, WIS., U.S.A.

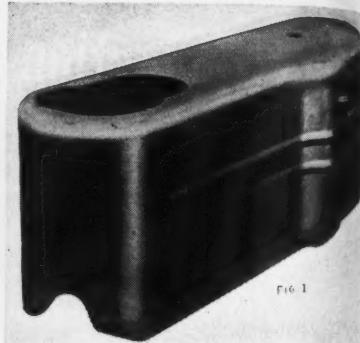
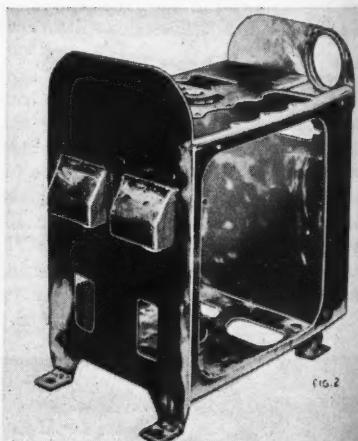


Fig. 1—Drill Press Guard Made of Welded 16 Gauge Sheet Steel

The drill press guard shown in illustration Fig. 1 is made of welded 16 gauge sheet steel. In making the guard holes were punched in the top and an incurring flange, designed to improve the operation of the guard, was added. This type of guard is said to be strong, durable, and unusually resistant to breakage.

In the same manner, light bases and frames are lending themselves to sheet metal fabrication. Illustration Fig. 2 shows a fairly complicated control box for an electric switch on a crane which is now made by welding. The framework, which is made of $\frac{1}{8}$ -inch hot

Fig. 2—Electric Crane Switch Control Box Made By Welding



TUNGSTEN CARBIDE TIPPED TOOLS

Price \$1.00 Each In Any Size

NEW LOW PRICES — INCREASE PRODUCTION — CUT OPERATING COSTS

Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.



SERIES 100

Left—100 Series

Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size
R-100	L-100	$\frac{1}{4} \times \frac{1}{4} \times 2$
R-101	L-102	$\frac{5}{16} \times \frac{5}{16} \times 2\frac{1}{2}$
R-103	L-104	$\frac{3}{8} \times \frac{3}{8} \times 2\frac{1}{2}$
R-105	L-106	$\frac{7}{16} \times \frac{7}{16} \times 3$
R-107	L-108	$\frac{1}{2} \times \frac{1}{2} \times 3\frac{1}{2}$

Right— 200 Series

Tool No.	Shank Size
200	$\frac{1}{4} \times \frac{1}{4} \times 2$
201	$\frac{5}{16} \times \frac{5}{16} \times 2\frac{1}{2}$
202	$\frac{3}{8} \times \frac{3}{8} \times 2\frac{1}{2}$
203	$\frac{7}{16} \times \frac{7}{16} \times 3$
204	$\frac{1}{2} \times \frac{1}{2} \times 3\frac{1}{2}$



SERIES 200

Below— 300 Series

Tool No.	Shank Size
300	$\frac{1}{4} \times \frac{1}{4} \times 2$
301	$\frac{5}{16} \times \frac{5}{16} \times 2\frac{1}{2}$
302	$\frac{3}{8} \times \frac{3}{8} \times 2\frac{1}{2}$
303	$\frac{1}{2} \times \frac{1}{2} \times 3\frac{1}{2}$



SERIES 300

STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.

Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

We Carry Silicon Carbide Emery Wheels for Grinding Tungsten Carbide Tool Bits.

SEND FOR OUR NEW 1941 GENERAL CATALOG

VICTOR MACHINERY EXCHANGE, INC.

251 CENTER STREET

NEW YORK, N. Y.

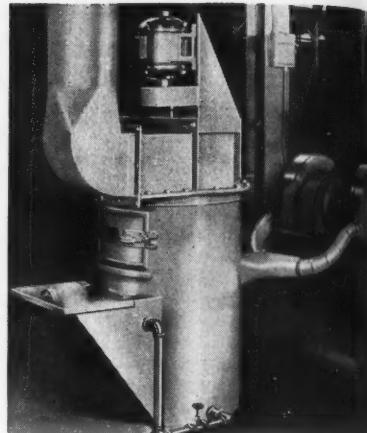
rolled steel, is said to be unusually light and strong.

Newcomb-David Uni-Wash Dust Collector

A water-type dust collector has been introduced by the Newcomb-David Co., 5741 Russell St., Detroit, Mich. The unit, which is known as the Newcomb-David Uni-Wash Dust Collector, is designed to efficiently remove dirt, dust, lint, grindings, fumes, and vapors from the air. It is said to be particularly adaptable to grinding and polishing operations. The unit can also be used in ventilating explosive ducts and hazardous operations in the finishing of magnesium alloys.

The Uni-Wash Collector occupies a minimum of floor space and is solidly built of welded steel. All bearings are of the ball bearing cartridge type. The bearings are ring sealed with Zerk lubricating fittings and, like the shafts and other parts, are standard, thereby making any necessary replacement easy and inexpensive.

As shown in the accompanying illustration, the dust collector requires only



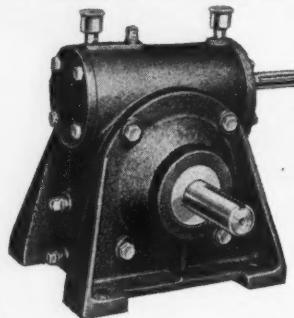
Newcomb-David Uni-Wash Dust Collector

one motor—a feature which contributes to low operating costs. In addition, the unit is designed to eliminate the need for a continuous flow of water. According to the manufacturer, it is seldom necessary to add water to the original supply except when the sludge tank is

Janette Speed Reducers

PROFIT BY OUR EXPERIENCE

The ruggedly constructed Janette speed reducers are used the world over because of their remarkable reliability.



*Send for Our 100
Page Catalog*

Since 1909, Janette has been building geared equipment with outstanding success. Many vitally important industrial machines that **MUST NOT FAIL**, depend upon Janette gear units.

There are 47 foot and flange sizes, in 16 different mounting positions; with motors from 1/50 to 10 H.P.; built to give speeds from .08 to 1140 r.p.m., available for driving your slow speed machines.

Janette Manufacturing Company
558 West Monroe Street Chicago

Defense Savings Pay-Roll Allotment Plan

How company heads can help their country, their employees, and themselves

voluntary pay-roll allotment plan

helps workers provide for the future
helps build future buying power
helps defend America today

This is no charity plea. It is a sound business proposition that vitally concerns the present and future welfare of your company, your employees, and yourself.

During the post-war period of readjustment, you may be faced with the unpleasant necessity of turning employees out into a confined and cheerless world. But you, as an employer, can do something now to help shape the destinies of your people. Scores of business heads have adopted the Voluntary Pay-roll Allotment Plan as a simple and easy way for every worker in the land to start a systematic and continuous Defense Bond savings program.

Many benefits . . . present and future. It is more than a sensible step toward reducing the ranks of the post-war needy. It will help spread financial participation in National Defense among all of America's wage earners.

The widespread use of this plan will materially retard inflation. It will "store" part of our pyramiding national income that would otherwise be spent as fast as it's earned, increasing the demand for our diminishing supply of consumer goods.

And don't overlook the immediate benefit . . . money for defense materials, quickly, continuously, willingly.

Let's do it the American way! America's talent for working out emergency problems, democratically, is being tested today. As always, we will work it out, without pressure or coercion . . . in that old American way; each businessman strengthening his own house; not waiting for his neighbor to do it. That custom has, throughout history, enabled America to get things done of its own free will.

In emergencies, America doesn't do things "hit-or-miss." We would get there eventually if we just left it to everybody's whim to buy Defense Bonds when they thought of it. But we're a nation of businessmen who understand that the way to get a thing done is to systematize the operation. That is why so many employers are getting back of this Voluntary Savings Plan.

Like most efficient systems, it is amazingly simple. All you have to do is offer your employees the convenience of having a fixed sum allotted, from each pay envelope, to the purchase of Defense Bonds. The employer holds these funds in a separate bank account, and delivers a Bond to the employee each time his allotments accumulate to a sufficient amount.

Each employee who chooses to start this savings plan decides for himself the denomination of the Bonds to be purchased and the amount to be allotted from his wages each pay day.

How big does a company have to be? From three employees on up. Size has nothing to do with it. It works equally well in stores, schools, publishing houses, factories, or banks. This whole idea of pay-roll allotment has been evolved by businessmen in cooperation with the Treasury Department. Each organization adopts its own simple, efficient application of the idea in accordance with the needs of its own set-up.

No chore at all. The system is so simple that A. T. & T. uses exactly the same easy card system that is being used by hundreds of companies having fewer than 25 employees! It is simple enough to be handled by a check-mark on a card each pay day.

Plenty of help available. Although this is your plan when you put it into effect, the Treasury Department is ready and willing to give you all kinds of help. Local civilian committees in 48 States are set up to have experienced men work with you just as much as you want them to, and no more.

Truly, about all you have to do is to indicate your willingness to get your organization started. We will supply most of the necessary material, and no end of help.

The first step is to take a closer look. Sending in the coupon in no way obligates you to install the Plan. It will simply give you a chance to scrutinize the available material and see what other companies are already doing. It will bring you samples of literature explaining the benefits to employees and describing the various denominations of Defense Savings Bonds that can be purchased through the Plan.

Sending the coupon does nothing more than signify that you are anxious to do something to help keep your people off relief when defense production sloughs off; something to enable all wage earners to participate in financing Defense; something to provide tomorrow's buying power for your products; something to get money right now for guns and tanks and planes and ships.

France left it to "hit-or-miss" . . . and missed. Now is the time for you to act! Mail the coupon or write Treasury Department, Section A, 709 Twelfth St. NW, Washington, D. C.



FREE - NO OBLIGATION

Treasury Department, Section A,
709 Twelfth St. NW., Washington, D. C.

Please send me the free kit of material being used by companies that have installed the Voluntary Defense Savings Pay-Roll Allotment Plan.

Name _____

Position _____

Company _____

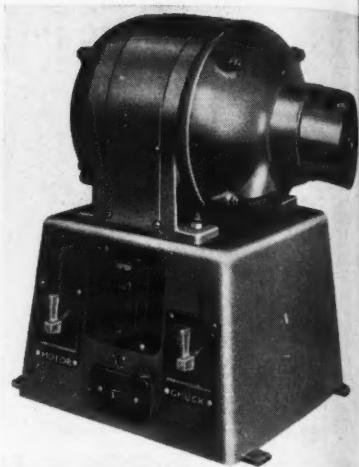
Address _____

428408

periodically drained for cleaning.

In the operation of the Newcomb-David Uni-Wash Dust Collector, the air enters through an inlet pipe which can be located in the back or on either side, depending on the selection of the most practical location for the dust collector in relation to the equipment to which it is attached. As the air enters the unit, a powerful exhaust fan draws it, in combination with a spray from the water in the tank below, through a circular suction cone. Directly above the cone is a revolving screen moisture eliminator which separates the water from the air. The air then passes through the exhaust fan and into the air outlet and to the working area.

The dirt removed from the air is deposited in the sludge tank. The sludge is easily removed, even when the dust collector is in operation, through a sludge removal compartment on the front of the unit.

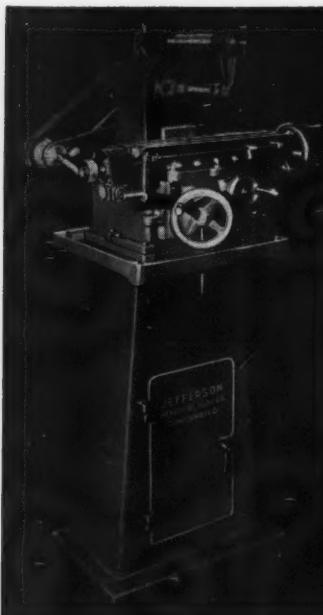


Lima Magnetic Polishing Lathe

Lima Magnetic Polishing Lathe

A magnetic polishing lathe for use in handling small steel parts has been developed by The Lima Electric Motor

Co., Lima, Ohio. The unit is designed to handle steel parts from 2 to 5 inches in diameter, and the faceplate of the magnetic chuck is interchangeable to accommodate different sizes and shapes.



JEFFERSON "BULL DOG" MILLING MACHINES

This motor driven power feed precision milling machine is capable of close tolerances on die sinking, contour profiling, angular milling, jig boring, routing of ferrous, non-ferrous metals, fibre and plastics for production line or toolroom. Has 4 spindle speeds: 200, 400, 700 and 1000 R.P.M. The power feed has a 3-step V Belt Drive for each spindle speed. Drum type forward and reverse control. Built-in coolant system can be furnished. Slides are dove-tailed, gibbed and hand scraped to perfect alignment. The table is equipped with 3 T slots to accommodate standard T bolts for tightly clamping work or fixtures. Write for details.

JEFFERSON MACHINE TOOL CO.
750 WEST FOURTH STREET
CINCINNATI • OHIO



Lathe

is designed
to 5 inches
late of the
angeable to
and shapes



GES-9 Electric HAND SHEARS

Capacity: Cuts 14 Gauge Sheet Steel
or 16 Gauge Stainless

**NOW AVAILABLE
TO SPEED NATIONAL DEFENSE**

This new sheet metal shear was brought out to fill the demand of the sheet metal industry for a very light-weight but powerful, fast-cutting tool, capable of cutting accurately to the line along straight lines as well as along small curves.

This sturdy shear will give a lifetime of service. The ball bearing "Grip" type Universal motor $\frac{1}{8}$ horse power will operate on either AC or DC and 110 or 220 volts, 25 to 60 cycles. This new model has fuse protection incorporated in switch box. Alloy Steel cutters—will cut at the rate of 6' 6" per minute on 14 gauge sheet steel. Write for further information.

James W. George Machinery Co.

3146 East Jefferson Ave., Detroit, Michigan

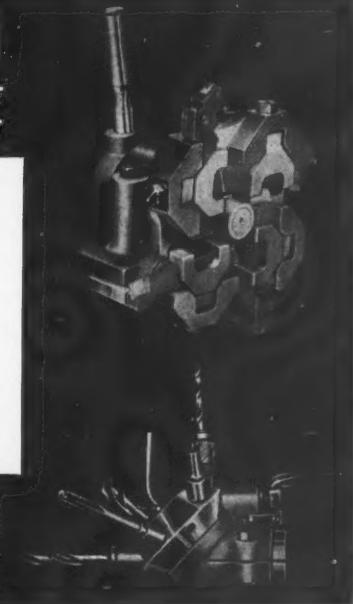
JEFFERSON

4-TOOL TOOL-POST TURRET
5-TOOL TAIL-STOCK TURRET

You can convert any engine lathe into a complete precision turret lathe with the Jefferson 4-tool tool-post turret, 5-tool tail-stock turret and Adjustable Pull Feed—and double its capacity. For forming, roughing, boring, finishing, drilling, tapping, etc.

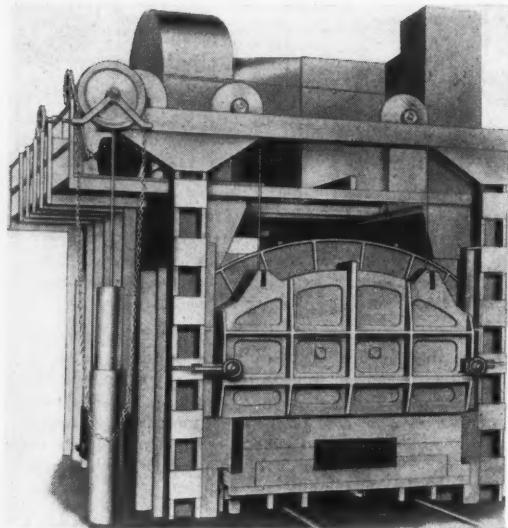
The Tail Stock Turret is made in four sizes to fit small bench lathes up to lathes with 20" swing.

The Tool-Post Turret is made in 2 sizes for standard 0, 00; No. 1 and No. 2 tool holders. Delivery 10 days. Write for folder.



JEFFERSON MACHINE TOOL CO.
750 WEST FOURTH STREET
CINCINNATI • OHIO

Mahr Stress Relief Furnace



of parts. The magnetic chuck is mounted on motor shaft and has a self-contained d.c. supply.

The Lima Magnetic Polishing Lathe is available in motor speeds from 600 to 3,600 r.p.m., with both single and two-speed motors to provide wide speed selection.

Mahr Stress Relief Furnace

A car bottom, recirculating, stress relief furnace has been brought out by the Mahr Mfg. Co., Division of Diamond Iron Works, Inc., Minneapolis, Minn. The furnace is available in two types, an externally-heated and direct-fired type.

The externally-heated type has remote

heaters, each with a suitable heat fan mounted on top of the furnace. The heated air is forced into the furnace by means of the fans and through refractory ducts built into the walls, the air being delivered into the furnace chamber through several openings at various levels along the length of the side wall. The hot air circulates throughout the chamber and is withdrawn and returned to the heaters for re-heating and recirculation.

The direct-fired type is arranged for over and under firing directly into both side walls of the furnace. In this type, too, the gases are carried away from the furnace chamber and recirculated from the top of the furnace.

Heaters are equipped with flame retention nozzle burners manifolded to proportional mixers. In the direct-fired type, burners are installed in the furnace side walls — half arranged for over firing and half for under firing. These burners are manifolded in groups of two to one proportional mixer. If gas is not available, oil burner installation can be made along similar lines.

The recirculating fans are 80 per cent alloy heat fans designed for withstanding temperatures up to 1,600 deg. F., thus providing an ample margin of safety above operating temperature (1,250 deg. F.). Each fan is driven by an electric motor of suitable horsepower, and is provided with a magnetic starter.

Three types of heat flow may be obtained in the Mahr recirculating fur-

SOMETHING NEW IN SURFACE PLATES



At remarkably low prices you can now get these new Delta Surface Plates offering features never before available in plates of this type. They are precision ground to close limits . . . all edges are machined square with each other and with the face . . . they have wide ledges all around for clamping work, angle plates, vises, etc. . . . and are of massive construction with heavy ribbing to prevent warping. Ideal for layout work . . . simple to convert into precision plates, if desired, by hand scraping to each other or master plates. Far superior to makeshift plates.

The DELTA MANUFACTURING CO. 601-B E. Vienna Ave., Milwaukee, Wis.



TWO SIZES:

No. 640 — 15" x 18" \$16.00; No. 641—16" x 22" at \$23.50. Immediate delivery.

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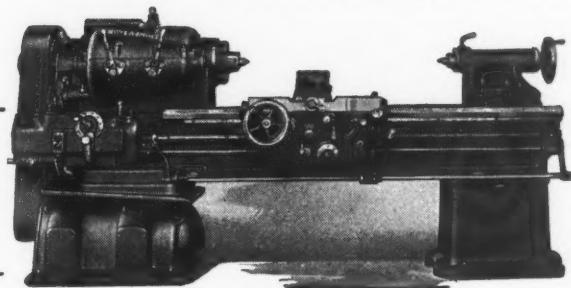
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11—16" 22"
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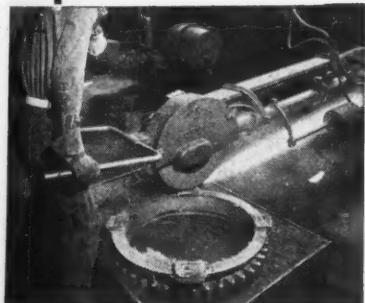
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BOYÉ & EMMES ENGINE LATHES



THE BOYÉ & EMMES MACHINE TOOL CO.
CINCINNATI • OHIO

Faster, Cheaper ROUGH GRINDING with MARSCHKES



The MARSCHKE Line

Over 70 specifications of Swing Frame,
Floor Stand and Pedestal Grinders
and Buffers—1 to 25 H.P., 10" to 30"
wheels. Write for Marschke Catalog.

VONNEGUT MOULDER CORP., 1801 Madison Ave., Indianapolis, Ind.

Maximum life for the expensive abra
sive wheels used in snagging and
rough grinding operations can be at
tained only with smooth running
wheels turning at correct speeds dur
ing all stages of wheel life. This de
pends upon good machines. The
eighteen features of Marschke Grind
ers—including inflexible spindles and
controlled speeds—guarantee superb
efficiency to users. Marschkes are un
equalled for dependable durability,
stand up under toughest, dirtiest work
ing conditions. Marschke Swing Frame
and Floor Stand Grinders are the eco
nomical machines for all heavy duty
rough grinding operations.

nace. In the convection heated furnace, Mahr laminar (cross) flow may be had for armor plate or other flat work. While there is a pronounced and complete turbulence of hot gases in the entire furnace chamber, the heat is brought from the heaters through one side wall and forced across the chamber and withdrawn upward through the opposite wall to be reheated and recirculated.

Also in the convection heated furnace, the heat may be driven down both side walls and into the furnace chamber, then drawn upward through the center

arch and back to the heaters for reheating and recirculation. This type of heat flow is particularly adaptable for welded or cast pieces.

In the direct-fired furnace, where the recirculating fan is used only for cooling, the heat comes directly from the burners into the chamber and is withdrawn through the top to the atmosphere. This type of heat flow is also most suitable for welded or cast work.

To cool the Mahr Furnace, the fuel supply to the burners is shut off. Cold air is introduced into the furnace by means of the fans. The amount of cold air taken in and hot air taken off is regulated by dampers, which are motor driven and automatically controlled from the furnace controller. Control equipment is also provided so that the cycle may be set for any predetermined rate of cooling.

The furnace car is equipped with I-beam type stock supports made of Diamahr heat resistant metal. The supports are properly spaced along the length of the car. This arrangement allows for the proper spacing of inlet vents located near the top of the car, thus providing for circulation both under and around the charge. A suitable rack and pinion car moving mechanism

Morton Salt Co. Chicago, Ill.

HEAT FAC

WORKERS WHO *Sweat* NEED Salt
• USE MORTON'S SALT TABLETS •

Air-O-cheke
TRADE MARK

LEAKPROOF AIR GUNS

Totally Different—Much Better
Repeat Orders by Hundreds
from Leading Plants

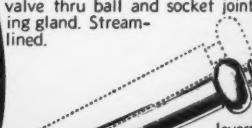


Get acquainted with
the modern air gun.

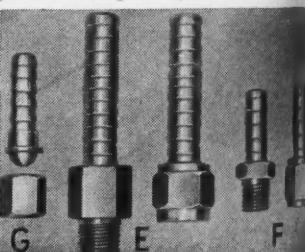
Try an Air-O-Chek and see the
difference. Order sample on
approval from stock. Just specify
size of hose.

Made of Bar Brass
and Stainless Steel.

Exclusive Patented Design Only Air-O-Cheks have enclosed lever that operates valve thru ball and socket joint. No packing gland. Stream-lined.



No external
levers or buttons.
Long service—low main-
tenance. Priced low. Types
and sizes for all requirements.
Catalog on request.



Fittings for Air and Welding Hose Standard and extra long shanks. Shipped from stock. Catalog on request.

AIR-WAY PUMP & EQUIPMENT CO., 403 S. Jefferson St., Chicago

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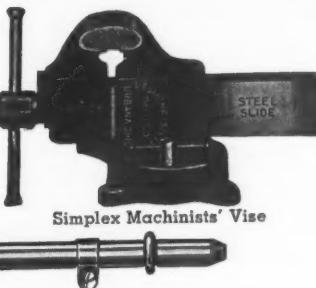
GRINDING WHEEL DRESSERS--VISES

We manufacture the only complete line of Grinding Wheel Dressers and cutters and will gladly suggest the proper one for your wheels.

The exclusive solid steel slide makes Simplex Vises stronger and more serviceable.



Desmond Hex Dresser

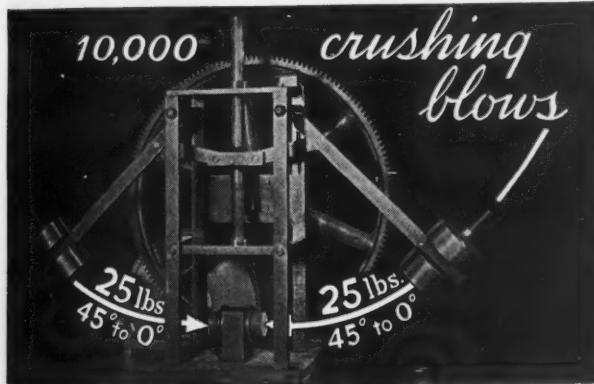


Simplex Machinists' Vise

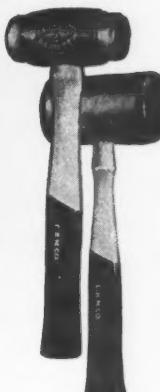
Desmond Diamo-Carbo Dresser, best tool room dresser.
Write for catalog M showing complete line of Desmond Dressers
and Simplex Vises and name of your nearest dealer.

DESMOND-STEPHAN MFG. CO., URBANA, OHIO

Canadian Desmond-Stephan Mfg. Co., Ltd. — Hamilton, Ont.



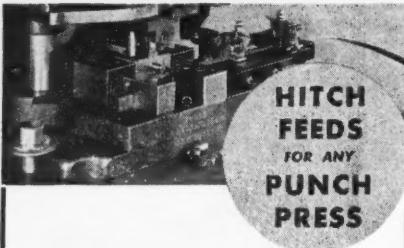
• Dramatic trip hammer "wear-test" fails to break down the smooth accurate striking surface of Chicago Rawhide Hammer.



After 10,000 blows with a free falling 25 lb. weight striking, crushing blows simultaneously on both faces of a Chicago Rawhide hammer—there was still a smooth, accurate striking surface. The genuine Java Water Buffalo hide faces had worn off $\frac{1}{8}$ " (less than one-quarter of the usable surface of hammer inserts). Even these solid steel knurled faced hammers, dropping 19" at 45° , had done nothing more than wear the surfaces. Your interest in this test is this: Chicago Rawhide Hammers and Mallets, which strike hard blows softly without damage, can take hard blows indefinitely without damage. Q. E. D. These economical long wearing tools are made in sizes and weights to meet every need. Insist on genuine Chicago Rawhide Hammers.

• CHICAGO RAWHIDE MFG. CO.,

• 1281 Elston Avenue, Chicago, Illinois



DICKERMAN Hitch Feeds are adaptable to any ordinary punch press without press alterations. Feeds from any position on any style die . . . from zero to its limit (2" on 2" Hitch Feed and 4" on 4" Hitch Feed) for each stroke of the press.

Quick set-up . . . economical for short runs.

Write for Folder No. 84.

H. E. DICKERMAN MFG. CO.

321 Albany Street Springfield, Mass.



- ◀ Special Anti-Mushrooming Anti-Chipping Heat-Treat
- ◀ Oversize Shanks
- ◀ Exclusive Knurled Back
- ◀ Exclusive Thumb Grip
- ◀ Broach-Rounded Corners

A Complete Engineering Service on Marking Devices

Write for Price and Data
Bulletin No. 113-12

NEW METHOD STEEL STAMPS, Inc.
149 Joseph Campau, Detroit

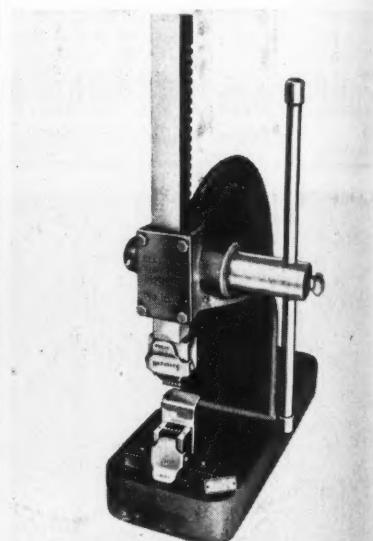
may be provided, if desired. Stairway and walk leading to the remote heater and fans are furnished.

The furnace casing is substantially constructed of 10 gauge sheet steel with structural steel reinforcing members welded throughout and fastened with anchor bolts to furnace foundation.

The door opening is covered with a Diamahr heat-resisting metal door lined with insulating fire brick and backed up with necessary insulation. A motor-operated door hoist is provided, complete with counterweight cylinder.

"Hercules" Embossing Press

An arbor press for use in embossing letters or figures into metal name plates, parts, tags, badges, metal checks, and so on, has been placed on



"Hercules" Embossing Press

the market by The Acromark Corp., 257 N. Broad St., Elizabeth, N. J. The machine incorporates the use of a male and female type "Hercules" Holder. The type in each holder can be quickly interchanged by simple thumb pressure on the holding clip. The accurate square ram of the press is said to ensure perfect meshing of characters.

An outstanding feature of the Her-

Stairway
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Press
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NOW—AS NEVER BEFORE

IT'S GREATER WHEEL PRODUCTION BETTER TOOL FINISHES MEAN FASTER CUTTING

Diamond Lapping Oil (Stadoil) is the genuine and the only product designed to lubricate diamond wheels and wire drawing dies.

OF GREAT VALUE TO EVERY TOOL ROOM AND WIDELY USED IN INDUSTRY.

Results that will positively amaze you, if you are not now using this interesting product. Order through your Mill or Tool Supply jobber—if they cannot supply you, then mail your order to us.

OUR INDUSTRIAL JOBBERS BELOW, if you are near them.

Chattanooga—
Harts' Automotive Supply Co.

Dallas—
Stadoil Manufacturing Co.

Cincinnati—
E. A. Kinsey Company

Detroit—
GRINDING SUPPLIES & SERVICE CO.

Cleveland—
Cleveland Tool & Supply Co.

Indianapolis—
Vonneget Hardware Co.

Dayton, Ohio—
W. H. Kiefaber Company

Minneapolis, Minn.—
Storm Manufacturing Co.

Toledo, Ohio—Cleveland Tool & Supply Co.

In Canada—CANADIAN GENERAL ELECTRIC COMPANY, Toronto, Ont., Canada
Carboley and Metals Division

Manufactured exclusively by

STADOIL MANUFACTURING COMPANY

617 S. Beacon St., Dallas, Texas —OR— 3221 S. Figueroa St., Los Angeles, Calif.

PROMPT DELIVERY

You save three ways when you order Willey's General Purpose Tools:

1. Increased production.
2. Lower operating costs.
3. Prompt delivery saves down time.

Tipped with Willey's Metal, these tools are suitable for machining cast-iron, tough hard rubber, bakelite, fibre, and tough alloy steels.

Standard tools, in many cases, will handle 90% of your requirements. Special tools quoted on request.

WRITE FOR BULLETIN No. 142

Announces price reduction on Willey's Standard Tungsten Carbide Cutting Tools and Blanks.



WILLEY'S CARBIDE TOOL CO.

1340 W. Vernor Highway, Detroit, Michigan

les Embossing Press is the mirror-finish metal plate at the back of the female holder. The plate shows a reflected image of each character face, thus expediting character changing and aiding in the matching of male and female characters.

Tempilstik®

The Tempil Corp., 132 W. 22nd St., New York, N. Y., maker of Tempil® Thermometric pellets, announces a new, convenient form of its product, to be known as Tempilstik®.

Tempilstiks®, like Tempil® pellets, have a specified melting point. They are available in convenient temperature intervals from 125 to 1,600 deg. F., and have a mean accuracy of within 1 per cent of the temperature clearly stamped on each stick. Thus, a 300 Tempilstik® drawn across a surface heated to less than 300 deg. F. will leave a chalk-like mark which melts sharply into a liquid streak when the surface reaches 300 deg. Fahrenheit.

Tempilstiks® provide a simple and convenient method of signaling desired pre-heating temperatures in the welding of

steel, special alloys, cast iron, and non-ferrous metals; in local heating, heat treatment, and fabrication of metal generally, in short, for all metal working operations which require careful and accurate temperature control. They are said to be particularly useful in the black-heat range where the importance of accurate control is becoming increasingly recognized.

Tempilstiks® offer a means of leaving temperature signal marks on inaccessible places such as vertical, inclined and overhead surfaces. Properly used, each stick will yield up to 1,000 temperature determinations. Tempilstiks® are supplied in a handy individual tube that fits the pocket and prevents breakage.

"Hardsteel" Reamer

A "Hardsteel" Reamer which is said to be capable of reaming steel of any degree of hardness without annealing has been developed by the Black Drill Co., 5005 Euclid Ave., Cleveland, Ohio. Made of the same metal used in Hardsteel Drills, the reamer is designed to operate in a manner similar to these drills.

The Hardsteel Reamer is said to ream



"American Swiss" Swiss-Pattern Files are available in over 3000 shapes, cuts and sizes... made in U. S. A.

★ ★ ★

American Swiss
SWISS-PATTERN **FILES**

AMERICAN SWISS FILE & TOOL CO. • ELIZABETH, NEW JERSEY

... and operating, heat of metal metal work careful and. They are in the importance increasing of leaving in inaccess- 1, inclined, properly used 100 temper- "Sticks" are tube that breakage.

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"Quick Way" High Speed Power Hack Saw Blade Grinding Fixture



Everyone connected with metal cutting and shaping knows that correct and frequent grinding of tools is absolutely necessary. You would never allow a mechanic to use a dull broach or a dull drill. You require that all tools be sharp before using and be reground the moment dullness begins.

THIS NECESSARY PRACTICE HAS BEEN NEGLECTED IN REGARD TO POWER HACK SAW BLADES. THIS NEW METHOD OF GRINDING BLADES NOT ONLY INCREASES CUTTING EFFICIENCY BUT EFFECTS GREAT SAVING IN BLADES AS WELL.

Quotation Furnished Upon
Application. Write for
Illustrated Folder.

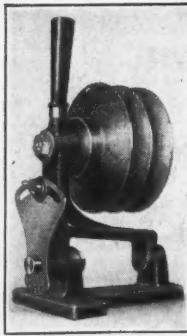
Industrial Engineering Co., Inc.
P. O. Box 433, 311 Sixth Avenue, South
MINNEAPOLIS • MINNESOTA

WE'VE GROWN
6½ TIMES BIGGER
SINCE 1935!



There's basic business virtue in building a better product or we couldn't have increased our plant space 6½ times since 1935. Universal drill bushings have super-finished bores straight and round within .0001 assuring accuracy and unexcelled wearing qualities. Black domes resist rust and improve appearance. All standard sizes available for speedy delivery. Write for facts.

UNIVERSAL
Engineering Company
Frankenmuth, Mich.



TOLEDO Variable Speed Transmissions

For variable speed control of V Belt driven equipment.

Low in cost . . . Easy to Install . . . Convenient Size . . . Simple to Operate . . . No Belts to Shift . . . Infinite Speed Selection in Stepless Speed changes.

Types 1A and 2A Provide up to 3 to 1 Ratio with Power Ratings from Fractional to 4 H.P.

Other Types Available to Provide Speed Changes up to 10 to 1 Ratio.

All Types Available Either In Complete Assembly or Wheel Assembly Only.

If you have a variable speed requirement it will pay you to investigate these devices.

Write for literature and quotations.

THE TOLEDO TIMER CO.
2224 ALBION ST. TOLEDO, OHIO

metal of any hardness up to and including nitrided surfaces with a minimum of tool wear. According to the manufacturer, the reamer has been successfully used on carburized, oil hardened, water hardened, cyanided, and nitrided

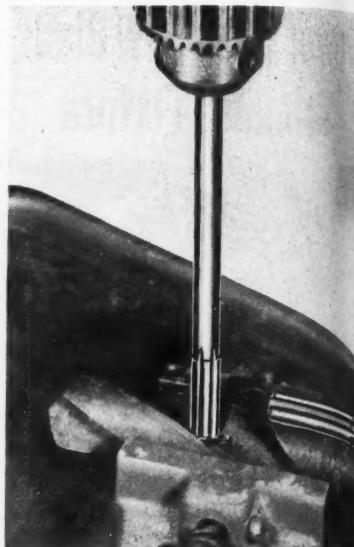


Illustration showing "Hardsteel" Reamer reaming a hole in a twist drill with a Rockwell 60 C.

pieces of high carbon, high chrome, and high speed steel, and other materials.

MAXI-JR.-E.

Super Sensitive Drilling Machine

Customers are sending in repeat orders tell us, "We want your machine—it's 'Tops'." You, too, will find it "tops" on your small hole drilling where accuracy is essential. On instrument, aircraft, Diesel, and any other type of precision drilling, the Hamilton-Muehlmann Super Sensitive Drilling Machines have a recognized superiority in precision, sensitivity, and economy.

Write for catalog.

THE HAMILTON TOOL CO.
145 W. MADISON ST. CHICAGO, ILL.

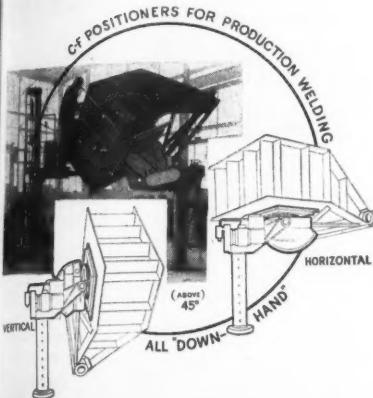
Bergonize

A washable protective covering for flat wall paint, compounded especially for use in plants where it is desirable to provide for easy cleaning of painted walls has been announced by The Bergonize Company, Merchandise Mart, Chicago, Ill. The material is to be known as Bergonize.

Bergonize may be applied over a newly painted or a cleaned wall and provides a clear, transparent, flat protective film that prevents dust, dirt, and grime from penetrating the pores of the paint. The material is odorless and dries flat within 20 minutes at 70 deg. F. and possesses high ability to reflect and diffuse light. Bergonize may be re-

and includ-
a minimum
the man-
been suc-
il harden-
and nitride

CULLEN-FRIESTEDT CO.,



CULLEN-FRIESTEDT CO.,

A fabrication of this size and shape requires many, many passes by the welder. On a C-F Positioner, such an assembly is a very simple welding job because the work may be tilted from horizontal to 135° beyond horizontal, or any angle, and turned in a complete circle to permit "down-hand," gravity fed fillets at every weld. The way to find out about these modern machines and their work is to write for our circular WP 20, gladly sent on request.

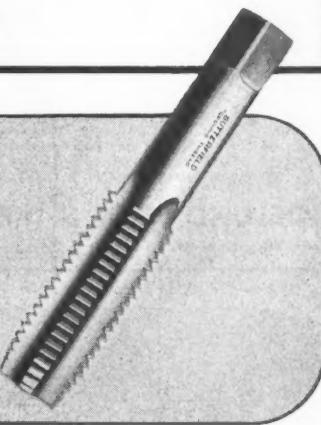
CULLEN-FRIESTEDT CO.

1311 S. KILBOURN AVE., CHICAGO, ILL.

BUTTERFIELD TAPS

When you buy Taps you actually pay for "Tapped Holes."

Specify "BUTTERFIELD" Commercial Ground Taps and be assured of more for your investment plus accuracy within .001 of an inch.



UNION TWIST DRILL CO.

BUTTERFIELD DIVISION

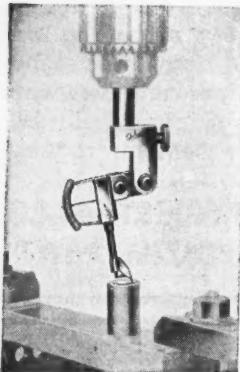
Factories: **DERBY LINE, VERMONT, U. S. A.**
Athol, Mass.; Mansfield, Mass.;
Rock Island, Quebec, Can.

STORES:
Cleveland 5346 Superior Ave.
Chicago 11 S. Clinton St.
Detroit 6346 Cassino St.
New York 61 Reade St.

moved from a protected surface merely by application of water with a sponge or rag. The removal of the Bergonize coating takes with it all dirt and leaves the surface in its original paint clean condition. Bergonize is not recommended for use where steam escapes to condense on the walls or ceiling.

Wright "Speedway" Wire Rope Electric Hoist

A lightweight, compact, wire rope electric hoist, to be known as the



NEW!
OSLUND
Micro-
Adjustable
Indicator
Holder
for
Jig Borers,
Milling Machines
and Boring Mills

No tapping necessary to set. Move to approximate position with a light touch. Lock. For final setting use Micro-Adjusting screw. Set-up time is greatly reduced and more so, if used in conjunction with an Oslund Universal Indicator having a scale readable in a 360 degree swing. • Holder can be furnished to fit any popular Indicator.

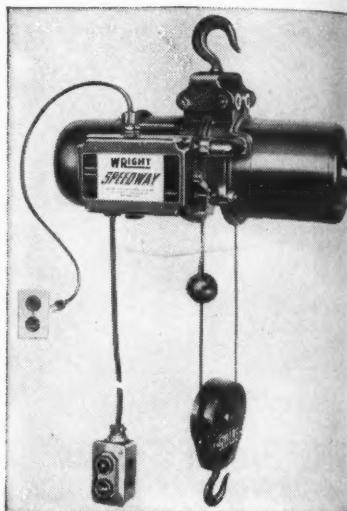
INFORMATION ON REQUEST

OSLUND TOOL & DIE CO.

14 Sigourney St.

Hartford, Conn.

"Speedway," is now being marketed by the Wright Mfg. Division of the American Chain & Cable Co., Inc., York, Pa.



Wright "Speedway" Wire Rope Electric Hoist

The hoist is available in capacities from 250 up to 1,000 lb., and is designed for plugging into a lighting circuit or use with conductor systems. Portability, flexibility, and accessibility are the outstanding features claimed for the unit.

Important construction features of the Speedway include push button control; weatherproof, acidproof, dustproof, preformed hoisting cable on drum winding which is said to eliminate slack chain from fouling loads; safety limit switches, and safety load blocks.

The Wright Speedway Electric Hoist

THOR STAMPS give you more marks per dollar.

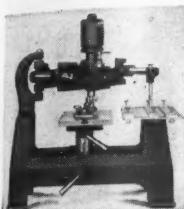
Made of correctly-heated alloy steel. Central striking point gives uniform indentation. Thumb side marking makes them easily read — easily used. Write for catalog.

THE PITTSBURGH STAMP CO.

812 CANAL STREET

PITTSBURGH, PA.

marketed by
the Ameri-
cans, York, Pa.



If you
have an
engraving
or marking
problem . . .

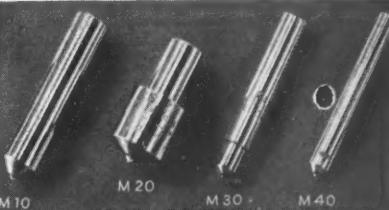
Investigate THE PANTO COMBINED ENGRAVING, ELECTRIC-MARKING, AND ACID-ETCHING MACHINE

Pantographic bench-type machine with interchangeable heads for three classes of work. Accurate, easy to operate, built for long reliable service.

» Write for literature

H. P. PREIS ENGRAVING MACHINE CO.
149A SUMMIT ST. NEWARK, NEW JERSEY

Dia-Brasive DIAMOND DRESSING TOOLS



ALL TYPES—ALL SIZES

For more than fifty years we have pioneered many important improvements in the use of industrial diamonds, cutting and dressing tools. Orders filled promptly for standard tools. Special dressers made to order. Write for new literature.

W. F. MEYERS CO., Inc.
DEPT. MS

BEDFORD, INDIANA

GOOD NEWS GETS AROUND . . .

Now, when every minute counts, the men at the machines, the men who actually do the work, are calling for GRIFFIN BLADES. Their consistently uniform performance has made GRIFFIN the "buy-word" among mechanics who appreciate dependability. The next time you order, specify GRIFFIN! Your distributor has a GRIFFIN BLADE for every cutting job.



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General Sales Agents

JOHN H. GRAHAM & CO. INC.

105 DUANE STREET

NEW YORK CITY

1880 — Made by G. W. GRIFFIN CO., Franklin, N. H. — 1942

GRIFFIN

Hack Saw Blades

is available for lug, hook, or trolley suspension. When used with trolley, the hoist can be mounted parallel or cross-wise to runway beam. The Speedway is furnished for operation on 110 or 220 volt single phase 60 cycle current, also 220 or 440 volt 3 phase 60 cycle current.

Oslund Indicator Holder

A precision adjustable indicator holder designed for use on jig borers, boring mills, and milling machines and adaptable for any indicator is announced by

**CLUTCH DRIVE
TAPPING
ATTACHMENTS**



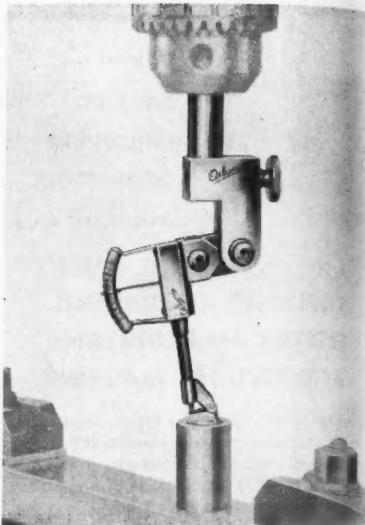
**TAPS DON'T BREAK
THREADS DON'T STRIP**

with the sensitive Dorman Clutch Feed. Clutch engages automatically on down stroke; reverses automatically on up stroke.

PROMPT DELIVERY!

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**DORMAN
MACHINE TOOL WORKS**
357 CANAL ST. NEW YORK, N. Y.



Oslund Indicator Holder

the Oslund Tool & Die Co., Hartford, Conn. With the holder, no tapping is said to be required in setting indicator, the latter being set by simply loosening one screw and then moving indicator to the approximate position desired. For final adjustment, a micro-adjusting screw on the holder is used.

By using an Oslund Universal Indicator with the holder, the operator need not move from his position, since the indicator scale can be read from any angle. By turning clamp of holder over to opposite side, a 5-inch swing of indicator can be obtained. An extension can be supplied to accommodate up to 14-inch swing of indicator.

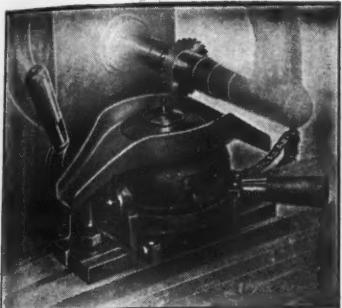


**HIGH
SPEEDS**

can be maintained because center revolves with the work in double row preloaded precision bearings.

Write for Catalog S-41.

THE READY TOOL CO.
510 IRANISTAN AVE., BRIDGEPORT, CONN.



DEARBORN Automatic Chucking and Indexing Fixture

MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN

70 S. CLIFF ST. • ANSONIA, CONN.

**It Was Necessary Then...It is
Vital Now to Keep Machines
and Equipment Dust Free. Dirt
and Dust That Cause Break-
downs and Delays Can Be
Easily Removed the
"Cadillac" Way**

ASK ABOUT
10 DAYS
FREE TRIAL OFFER



SEE YOUR MILL SUPPLY SALESMAN OR
WRITE FOR COMPLETE INFORMATION ABOUT

CLEMENTS

CADILLAC

PORTABLE ELECTRIC

BLOWERS & SUCTION CLEANERS
CLEMENTS MFG. CO.

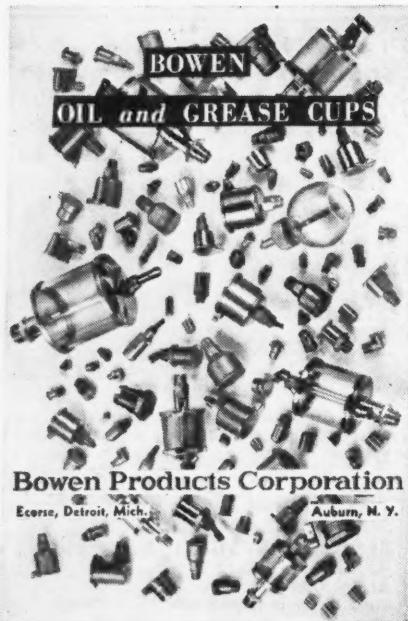
6655 S. Narragansett Ave. Chicago, Ill.

TRY THESE TOUGH
Mac-it Hex Head Alloy Steel Cap Screws

Heat treated for maximum strength (tensile of 145,000 lbs. per square inch minimum with elongation in excess of 15% in 2 inches). Milled from solid bar special alloy steel with all corners of hex clean and true. Accurate in lead, pitch and diameter. For tough screws—get Mac-its.

For catalog on the complete line of Mac-it Alloy Steel Screws—consult your distributor or write us direct.

THE STRONG, CARLISLE & HAMMOND COMPANY
1392 West Third St., Cleveland • Ohio



**SPEED WORK
SAVE EYES**

Only 6 steel tape rule with black markings on WHITE surface — acid-proof, crack-proof, smooth and hard. Unbreakable metal case calipers inside; outside measurements. Comes apart for cleaning, insertion of spare blade which doubles service life.

MASTER
Brite Blade

MASTER RULE MFG. CO., Inc.
815 E. 136 St., N. Y. C. (Dept. D2)

MASTER
WOOD AND TAPE RULES

\$1.50 ea.
with push-button lock

\$1.75
Spare Blade 65¢

To make your measuring quicker, more accurate and easier on your eyes, get **MASTER BRITE-BLADE**. At hardware stores, mill supply houses or sent direct postpaid.

MASTER RULE MFG. CO., Inc.
815 E. 136 St., N. Y. C. (Dept. D2)

2196A

CM "Meteor" Heavy Duty Electric Hoist

Shown here is the CM "Meteor" Heavy Duty Electric Hoist which is now being manufactured by the Chisholm-Moore Hoist Corp., Tonawanda, N. Y. The hoist is available in capacities of 1/2 ton and up.

Features of the hoist include streamlined design; aeroplane type cooling fins that quickly dissipate the heat generated by gears and load brake; fully enclosed, weatherproofed design which permits the Meteor to be universally



CM "Meteor" Heavy Duty Electric Hoist

used indoors and out; fully enclosed safety-type hook blocks, and specially designed electrical system which permits only 110 volts to pass through the push button station.

Eclipse Aviation Seamless Flexible Metal Hose

A flexible metal hose of greatly improved seamless corrugated construction has been made available by the Eclipse Aviation Division of the Bendix Aviation Corp., Philadelphia, Pa. The hose, which is available in a large variety of special alloys, is said to be practically indispensable in the building of modern transport, fighter, and bomber airplanes, tanks, submarines, and so on, as well as in various industrial applications.

The flexibility of the hose is derived from the movement in the side walls of each corrugation. The greater the number of side walls the greater the degree of flexibility. The flexibility is said to be further increased by the uniform metal in the corrugations as well as by the large outside diameter as compared with the inside diameter of the hose.

Duty

"Meteor" which is now Chisholm, Minn., N. Y. cities of 50,000

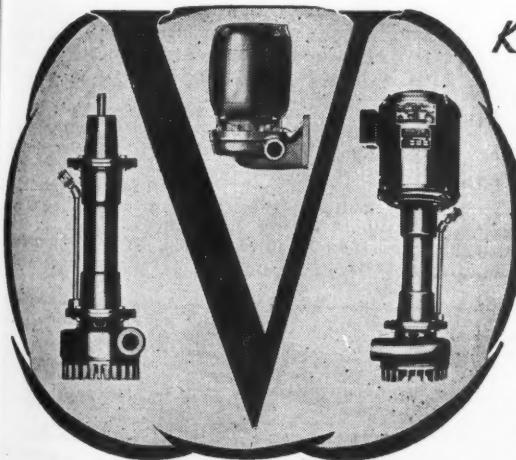
de stream cooling fins heat generated; fully enclosed design which is universally



"America's skilled workers"

"No job too big for Parker Vises"

The Charles Parker Company, Meriden, Conn.



Keep 'em flowing
**LUBRICANT AND COOLANT
PUMPS MUST NOT FAIL**

Production must go on. The speeding gears that operate unnoticed under cover—the whirling drills that push into tough metals—the valuable cutters that bite off vast quantities of steel—all must have lubricant or coolant—constantly and in the right amounts—right from the very instant the wheels start moving—it must "be there" when needed.

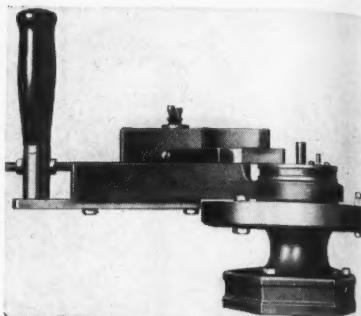
The increased facilities provided through our new home assure you of quick deliveries. Send for a complete catalog showing sizes and models.

PIONEER ENGINEERING & MANUFACTURING CO.
19647 JOHN R. DETROIT, MICH.

The small radii to which the hose may be bent is evidence of its flexibility. However, the hose cannot be straightened out to its original form and bent again repeatedly without stressing the metal beyond its elastic limit.

"Di-Acro" Bender No. 1

Designed for duplicating metal pieces of various types to within 0.001 inch of original part, a precision bending unit to be known as the "Di-Acro" Bender No. 1 has been brought out by the



"Di-Acro" Bender No. 1

O'Neil-Irwin Mfg. Co., 316 S. 8th Ave. Minneapolis, Minn. The range of contour forming and die duplicating operations available is limited only by the expansion and contraction limits of the material formed. Cerrobend may be used in connection with the bender for unusually complicated forming of extremely acute radii to die tolerances without material fracture.

The Di-Acro Bender is a two-way operating unit, being quickly adjustable to either right or left-hand operation. The two-way operation is designed to eliminate the conflict of ends of material when forming to intricate shapes.

The Di-Acro Bender, without alteration to design or disassembly, can accommodate simple shop-made attachments for forming angles, channel, round, round, hexagon, or square tubes, round, square, half-round, or flat wire, strip stock (on edge and vertically), and any other ductile materials. The well distributed weight of moving parts and adjustable main bearing assure ease of operation of the unit.

The Di-Acro Bender No. 1 is compact and portable and is said to be ideally

EKLIND **UNIVERSAL**
 MILLING HEAD

SELF-CONTAINED.
ADAPTABLE
TO ANY
MACHINE

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Mills
Drills
Bores
At Any Angle

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SPEEDS
FROM
250-4000

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UNIVERSAL HIGH-SPEED TOOL CO.
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HINGES

VARIOUS WIDTHS
and GAUGES

BUTTS AND
CONTINUOUS LENGTHS

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S & S MACHINE WORKS
4541 W. LAKE STREET HARDWARE DIVISION CHICAGO, ILLINOIS

For
GUARDS
CABINETS
CASES
BOXES

"NEW D & W" MAGNETIC CHUCKS

Styles 7 x 17 and 6 x 13

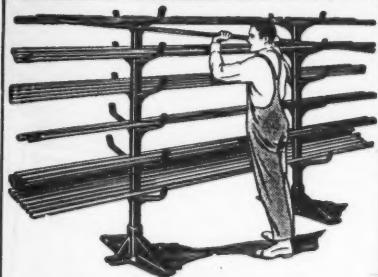


Developed to meet demand for chucks lower than our standard style.

Send for folder covering
Chucks and Demagnetizers.

J. & H. ELECTRIC CO.
202 Richmond St. Providence, R. I.

A TIME SAVER



The BROWN SECTIONAL RACK saves the time wasted end-hauling stock from the old-style, closed-side rack and quickens the selection of sizes by greater visibility. Built of standard metal sections: can be expanded for changes in stock or growth of business. Made in 5 styles: can't burn, depreciation practically nil.

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BROWN
ENGINEERING CO. 120 N. THIRD ST.
READING, PA.

February, 1942



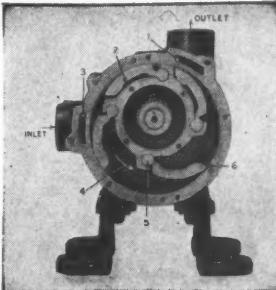
Gather Your Rightful Profits

By Using the World's
Champion in
LEIMAN BROS. PATENTED

VACUUM PUMPS

Also Used as Pressure Blowers,
Gas Boosters, and Air Motors.

They Take Up Their Own Wear



LEIMAN BROS. INC.

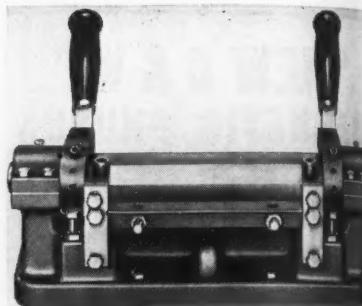
168-3 Christie St.
Newark, N.J.

adapted for either bench or assembly line work. The base and arm castings of the unit are of heavy machine tool grey iron. The main bearing, which consists of grey iron to hardened steel, is adjustable for wear and alignment. All contact surfaces of the bender are properly heat treated and hardened to resist wear.

"Di-Acro" Brake No. 1

The "Di-Acro" Brake No. 1 shown herewith, product of the O'Neil-Irwin Mfg. Co., 316 S. 8th Ave., Minneapolis, Minn., is designed to economically and rapidly duplicate form all types of metals and spring tempered materials, within their ductile limits, to intricate and complicated shapes and outlines, and make boxes without fingers or extra attachments. The brake is constructed to cover the working range between the large heavy floor type brake for forming heavy work and the bench vise or thumb and finger-operated pinchers for shaping light work.

Working operations are completely visible to the operator, thus allowing him full control and inspection of work



"Di-Acro" Brake No. 1

for extremely accurate metal duplicating and the producing of non-stock die angles, channels, and vees from stock materials.

All contact surfaces of the brake may be changed for accommodating a large variety of die duplicating work without disassembly of the unit. Contact surfaces may be drilled and tapped for special material guides or relieved for working material with interfering planes. Complete horizontal and vertical adjustment of all contact surfaces

We've got it!

**DOES YOUR
GRANULATED INDUSTRIAL
SKIN CLEANSER
have**

**THESE THREE
SAFETY FACTORS**

- 1. pH Below 10
- 2. No Free Alkali
- 3. Low Alkaline Salts
(not to exceed 8% cal-
culated as sodium Car-
bonate) buffered and
balanced against pH.

G. H. PACKWOOD MFG. CO.

PAX
TRADE MARK
REG. U. S. PAT. OFF.

**FIRST
SINCE
1926**

PAX
2042 WALNUT, DEPT. D, ST. LOUIS





**AT TIMES we can ship
some sizes FROM STOCK**



GRAHAM MULTI-PURPOSE VISE

Tremendously increased demand has enabled us to install new high-production methods, so that we usually are able to keep a small stock ahead. Vise is used on driller, planer, miller, shaper, etc., with or without Jig Attachments shown.

Also shipping from stock: **KNURL HOLDERS**, to fit lathe turret; **DRILL SPEEDERS**, to increase speed 3 times.

REQUEST CIRCULARS AND PRICES

GRAHAM MFG. CO., INC.
35 BRIDGE ST. EAST GREENWICH, R. I.

**Why Use A Shaper
to cut Keyways when a**

**DAVIS
KEYSEATER**

**will do the
job so much
quicker
and
better?**

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Send
for
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DAVIS KEYSEATER CO.

Exchange and Glasgow Sts.
ROCHESTER, N. Y.

INSPECTOGRAPH

Complete with TRANSFORMERS,
FLUORESCENT TUBES, STARTER,
6' CORD AND SWITCH.

Width, 11½". Height, 12".
Depth, 10". Lens Dia., 4".

Regardless of the type of overhead lighting used in modern shops it is impossible to eliminate shadows and glare. For this purpose the Inspectograph was designed. A soft diffused fluorescent light was so enclosed as to be concentrated solely upon the object, thus barring all outside light which normally varies a great deal. A large lens was added to speed up inspection and to reduce unnecessary eye strain.

The Inspectograph's great range of adaptability and application makes it an item of necessity which no concern, whether large or small, can overlook. A better quality of work alone is enough to justify its use.



**FOR FINE AND
ACCURATE WORK**

**FOR INSPECTION
OF FINISHED PARTS**

**JUST A FEW OF THE MANY
USES FOR THE INSPECTOGRAPH
IN MACHINE AND TOOL SHOPS:**

Finding cracks, scratches and tool marks on dies. Working on small punches. Inspecting bearing surfaces.

Sharpening tool bits, drills, reamers and milling cutters. Accurate micrometer reading. Laying out fine work: Inspecting screw machines products, gun parts, gauges, taps, castings.

FULLY GUARANTEED—SOLD ON 10 DAYS FREE TRIAL

Model A (Single Bulb) Net Price, \$22.40 Ea.

Model B (Double Bulb) Net Price, \$26.40 Ea.

SCHULTZ & ANDERSON CO., 174 Ferry St., Newark, N. J.

is provided for accurately setting to duplicate either obtuse or acute angles of natural radii over the entire capacity range of the unit. Precision adjustable stops are provided for duplicating angularity of work to die tolerances. All adjustment bolts are provided with lock screws.

The handles of the Di-Acro Brake may be removed for either right or left-hand operation, or both handles may be used simultaneously for heavy metal forming. Material guides can be quickly adjusted for accurate metal duplicating and rapid folding of sheet material

and strip stock on production basis.

The Di-Acro Brake No. 1 is compact and portable and is well suited for either bench or assembly line work. The base casting of the brake is of heavy machine tool grey iron. Main bearings are of steel to grey iron, with 0.002-inch shim laminated adjustments provided for bearing wear. All contact surfaces of the unit are of cold rolled steel. Parts subject to wear are heat treated and properly hardened.

Ideal Demagnetizer

A compactly and powerfully designed portable demagnetizer for quickly demagnetizing tools, drills, punches, die-



*Send for
Valuable
Booklet
Forgings
for All Industries*

Rough Turned or
Finished Complete

Composite Die Sections, Extrusion Tools,
Crankshaft Forgings, Gear Forgings, Die Cast-
ing Dies.

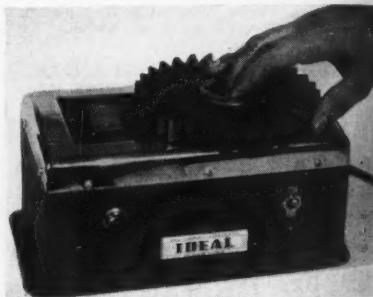
Rings, Discs, Blocks, Shafts, Hubs, Bars, and
Special Shapes. Tool Steel of All Makes.

S.A.E. Specifications.

Stainless and Copper Forgings.

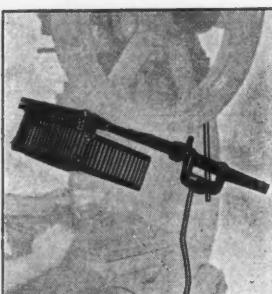
MAY WE SERVE YOU?

AJAX STEEL & FORGE CO.
205 ADAIR ST. DETROIT, MICHIGAN



Ideal Demagnetizer

and work held in magnetic chucks is announced by the Ideal Commutator Dresser Co., 4004 Park Ave., Sycamore, Ill. Abrasive particles such as metallic dust, flakes, fine chips, and so on, that cannot be wiped off clean with a rag are said to be easily removed after a single pass of tools or parts across the magnetic poles of the demagnetizer, thus



SAFETY EQUIPMENT FOR POWER AND FOOT PRESSES

Combination Gate and Barrier Guards
Two-Hand Safety Starting Devices
Sweep Guards... Single-Stroke Attachments
Treadle Guards... Fly Wheel Guards, etc.

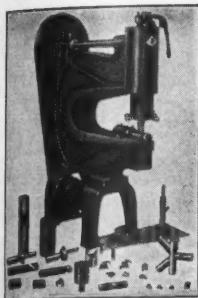
Write for Details

JOHN HUMM SAFETY EQUIPMENT CO.
251 SHEFFIELD AVE. BROOKLYN, N. Y.

basis.
compact
suited for
work. The
of heavy
bearings
0.002-inch
provided
surfaces
ed steel
t treated

SAVAGE NIBBLING MACHINE

FOR TUBE SLOTTING AND TUBE SHAPING—
FOR FAST AND ACCURATE CUTTING OF
FLAT SHEETS BY TEMPLATE OR TO A
SCRIBED LINE.



Showing Tube Cutting Attach-
ments and Samples of Work

Cutting Capacities
Flat Sheets Mild
Steel $\frac{1}{8}$ "
Tough Alloys $\frac{3}{16}$ "

Tubing
Wall thickness
to $\frac{1}{8}$ "
1" I.D. to
36" O.D.

Throat Depth
9" to 36"

Ask for
BULLETIN F

Manufactured by

W. J. SAVAGE COMPANY
KNOXVILLE Since 1885 'TENNESSEE
Pioneer Manufacturers of Nibbling Machines

U. S. HEADS

STANDARD SINCE 1915



Two Spindle Head
Both Spindles
Adjustable

The United States Drill Head Co.

1954 Riverside Drive
CINCINNATI, OHIO

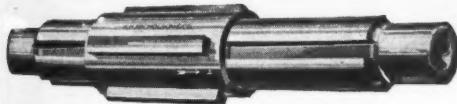
You Need These TIME SAVERS to Speed-Up All-Out Production

TYPE A—STEP JAW DESIGN

Size No.	Range of Bores Taken	Net Price
1A	$\frac{1}{2}$ " to 1"	\$12.00
2A	1" to $1\frac{1}{2}$ "	16.00
3A	$1\frac{1}{2}$ " to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00



NICHOLSON EXPANDING MANDRELS SLIDING JAW AND TAPERED SLOT TYPE



TYPE B—STRAIGHT JAW DESIGN

Size No.	Range of Bores Taken	Net Price
1X	$\frac{1}{8}$ " to $\frac{15}{16}$ "	\$10.00
2X	$\frac{15}{16}$ " to $2\frac{1}{32}$ "	11.00
3X	$2\frac{1}{32}$ " to $\frac{3}{4}$ "	12.00
00	$\frac{3}{4}$ " to $\frac{7}{8}$ "	14.00
0	$\frac{7}{8}$ " to 1"	16.00
1	1" to $1\frac{1}{16}$ "	18.00
2	$1\frac{1}{16}$ " to $1\frac{9}{16}$ "	21.00
3	$1\frac{9}{16}$ " to 2"	29.00
4	2" to $2\frac{1}{2}$ "	40.00

Economy tools for holding work while being machined between centers on lathes, grinders, mills, shapers, etc. Made of tool steel, hardened and accurately ground. Both types sold singly or in sets.

Prompt delivery on sizes shown as well as larger sizes taking up to 7".
Clip ad to your letterhead for bulletin. (Prices subject to change.)

W. H. NICHOLSON & CO., 136 OREGON ST., WILKES-BARRE, PA.

enabling such items to be laid on a bench or shelf without again attracting nearby metal particles.

Large parts may be demagnetized in a similar manner except that the demagnetizer, which is light in weight and easy to handle, is moved over the heavy, bulky work.

The Ideal Demagnetizer has an all metal, streamlined case and is equipped with an indicating light which shows when current is on. The unit is $5\frac{1}{2} \times 10\frac{1}{2} \times 4\frac{1}{2}$ inches in size and weighs 17 lb. It is rated at 115 volts, 50-60 cycles (5 amp.). Other voltages and frequencies are available.

Gear Specialties

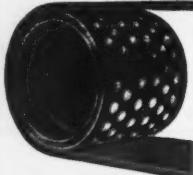
With considerable experience and exceptional facilities for the manufacture of high precision Small Gears, our manufacturing capacity is now heavily burdened with National Defense work, and we naturally feel pardonable pride in the importance and quality of our contributions to the Program.

While this very essential work takes precedence, we are keenly conscious of our duty to established customers; their needs must command our continued earnest efforts. Under such circumstances, we hope new inquirers will understand our inability to give their wants the consideration they would ordinarily receive.

Gear Specialties

MANUFACTURERS
CHICAGO

NO BELT SLIPS WITH VACUUM
CUP C. I. PULLEYS



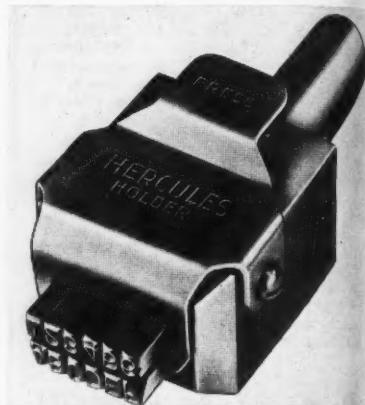
Pat'd U. S.
Canada
Great Britain

30 Day Free
Trial Offer.

Stock most Std. Sizes to 16" Dia.
Supply sizes 2" to 72" Dia.

"Hercules" Two-Line Type Holder

Designed for use in marking parts requiring double-line designations, the "Hercules" Two-Line Type Holder



"Hercules" Two-Line Type Holder

shown herewith is now being marketed by The Acromark Corp., 251-257 N. Broad St., Elizabeth, N. J. In use, one line of type can be arranged to include numbers, letters, or symbols and the other the number. Both lines consist of the same style of standard Hercules Holder Type (heavy duty shoulder style) and are quickly interchangeable by simple thumb pressure on the holding clip. Extra pieces of type permit quick changing to any desired number.

The holder is ruggedly constructed of shock-resisting heat-treated tool steel. The shank is available in any size to fit various size punch presses. Hercules

Shut Off Expense Caused by Slippage
You Save Money on Every Installation

NEW LOW PRICED PRODUCTION LINE
SEE PART LIST
Prices Below

Dia. Face Price	Dia. Face Price
2" x 2 $\frac{1}{2}$ "—\$1.25	4" x 3 $\frac{1}{2}$ "—\$2.85
2 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ "—1.45	4 $\frac{1}{2}$ " x 5 $\frac{1}{2}$ "—3.95
3" x 3 $\frac{1}{2}$ "—2.25	5" x 4 $\frac{1}{2}$ "—4.25
3 $\frac{1}{2}$ " x 3 $\frac{1}{2}$ "—2.55	6" x 5"—4.75

We Supply Fractional Dia. and Face Pulleys—from Large Casting Stock.

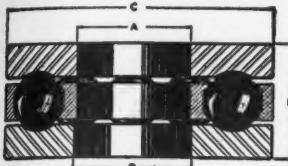
Increase
your
Production

VACUUM CUP METAL PULLEY CO., Inc.
12536 Grand River Ave., Detroit, Mich.

Type

g parts re-
tions, the
e Holder

GWILLIAM



TYPE GB GROOVED RACES BALL THRUST BEARINGS

STANDARD SIZES OR SPECIAL DESIGN to your specifications; send sketch or worn sample, regardless of condition, for quotation, without obligation. Our complete catalog will help you in making selection of bearings—shall we send it?

THE GWILLIAM CO.

358 Furman St., Brooklyn, N. Y.

LASOSAL

DRILL JIG BUSHINGS

AMERICA'S NEWEST
and FINEST
PRECISION BUSHING

GUARANTEED
ACCURACY and QUALITY

QUICK DELIVERIES OF LARGE ORDERS
Annual capacity over 1,500,000 Precision Bushings.
Small orders from finished or semi-finished stock.
Ask for Catalogs and Lists

FREDERICK M. LASERSON CO.
6518 Avalon Blvd., Los Angeles, Calif.



ATLANTIC

NON-TEMPERING

TOOL STEEL

the New Steel Shape

ELUTAGON

The SAFETY STEEL

This new steel shape furnishes a convenient, positive grip for chisels, punches, cutters and blacksmiths' tools.

This shape minimizes chipping and splintering.

Forging is simplified because there are no sharp corners to hammer into surface as on octagon and hexagon shapes.

Distinctive

Vacuum Grip

Safer

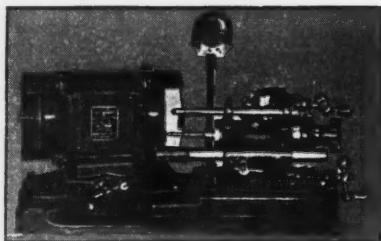
Write for complete details

ATLANTIC STEEL CO.

1775 BROADWAY, NEW YORK, N. Y.

Developers of Non-Tempering Tool Steel

KEEP TAPS SHARP TO KEEP TAPS THREADING



You'll get more service from your taps if you keep them sharp.

The J-B Tap Grinder sharpens right or left hand taps (2, 3, 4 or 5 flutes) uniformly on the chamfer . . . grinds any taper or angle of chamfer desired . . . can be accurately set or quickly changed for amount of relief.

Write for folder M.

EDWARD BLAKE CO.

634 COMMONWEALTH AVE.
NEWTON CENTRE MASS.



• Pioneers in the riveting field. Head rivets from smallest to $\frac{1}{8}$ " diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles.

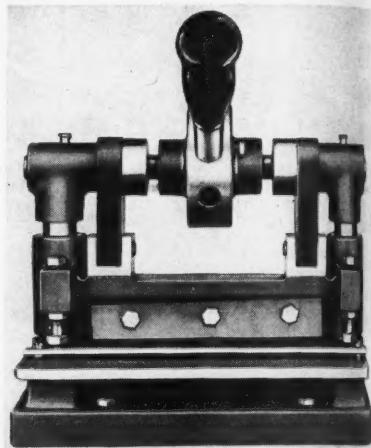
Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. Bridgeport, Conn.

Holders are also furnished in single line and curved line styles.

"Di-Acro" Shear No. 1

Built by the O'Neil-Irwin Mfg. Co., 316 S. 8th Ave., Minneapolis, Minn., the "Di-Acro" Shear No. 1 illustrated here-with is designed to rapidly and efficiently shear, slit, or notch all ductile and pliable materials, including spring tempered metals, plastics, Bakelite, rub-



"Di-Acro" Shear No. 1

ber, fabrics, leather, and so on, to tolerances within die accuracy. The unit is said to fill the requirement for a precision shear for work between the heavy floor type, foot-operated shear and the small thumb and finger-operated snips type of shear.

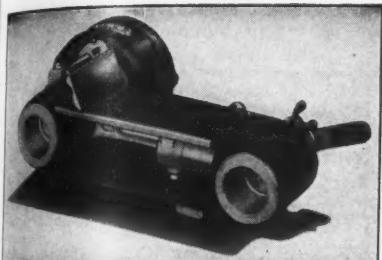
The design of the Di-Acro Shear enables the operator to closely observe work at all times, and the hand-operated lever of the unit provides a sensitive cutting control. The shear is designed to handle circular and irregularly shaped materials and materials with interfering planes where only part of the piece is to be trimmed.

Contact surfaces, working table, and guides of the Di-Acro Shear may be drilled or tapped for special guides or changed, without disassembly of the unit, for producing a large variety of duplicated work. Shear blade adjustments are provided which will permit the shearing of the maximum capacity

single line

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Mfg. Co.,
Minn., the
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all ductile
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elite, rub-



NEW ABRASIVE BAND GRINDER...

"Built Like a Machine Tool!"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with ALEMITE LUBRICATION complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

HORMEL-M GRINDER

WALLS SALES CORP.

96 WARREN ST. NEW YORK, N. Y.

**SPEED with SAFETY
on MACHINE REPAIRS**

CAPACITIES
5 TO 50 TONS

USE OTC TOOLS

The easy, safe, quick way to remove and replace wheels, gears, bearings, shafts, sleeves, pulleys, etc.

The OTC PULLING SYSTEM includes Pullers and Pushers for every need.

OTC GRIPOMATIC

PULLERS

have a patented grip which prevents slipping, avoids damage to costly parts, reduces accidents. Designed to facilitate working in close quarters.



SPECIAL PULLERS

and other industrial tools designed and built for special needs.

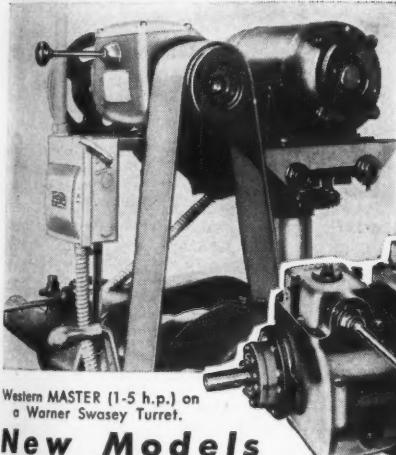
Write for

PLANT MAINTEN-
ANCE BULLETIN
No. PE-1320.

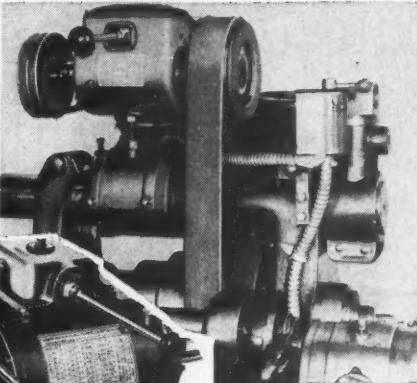
OWATONNA TOOL CO.

157 CEDAR STREET

OWATONNA, MINN.



Western MASTER (1-5 h.p.) on a Warner Swasey Turret.



Western MASTER (1-5 h.p.) on a Cincinnati No. 2 milling machine.

Inset: Western SUPER (10-30 h.p.) suitable for replacing gear boxes on large boring mills, radials, etc., and to motorize large slotters, engine and turret lathes.

New Models WESTERN TRANSMISSIONS

A MASTER, capacity (1-5 h.p.); a MAJOR, capacity (5-10 h.p.) and a SUPER (10-30 h.p.) can also be installed on shapers, radials, slotters, boring mills, gear cutters, die sinkers, etc.

WESTERN MANUFACTURING COMPANY • 3404 SCOTTEN AVE.
DETROIT, MICHIGAN

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in cold rolled steel plate to extremely narrow widths without buckling or knurling, as well as the hairline shearing of the very lightest materials.

Quickly adjustable for either left or right-hand operation, the Di-Acro Shear No. 1 is compact and portable and is said to be very well adapted for either bench or assembly line work. Shear blades are of unusually heavy tool steel, properly hardened and tempered. Blades are accurately ground and fitted, with full adjustment provided for wear and cutting control. Main shear bearings are provided with 0.002-inch laminated

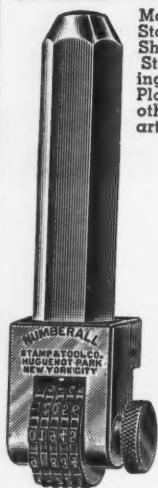
shims for bearing adjustment. Castings are of heavy machine tool grey iron.

Square D Multiple Unit Machine Control Stations and Enclosure

In answer to machine tool manufacturers' demands for greater flexibility of application, the Industrial Controller

Mark It Quickly with a NUMBERALL

Made with 1 to 10 wheels. Stamp in perfect alignment. Shank for Hand or Press Stamping. Platform for stamping Name Plates and other small articles.



N E W Quick Set Machine. One wheel can be turned quickly by knurled knob for consecutive numbering.

NUMBERALL STAMP & TOOL CO.
Huguenot Park,
Staten Island, N. Y.



Square D Multiple Unit Machine Control Stations and Enclosure

Division of the Square D Company, Milwaukee, Wis., is now offering a series of Class 9001, Type M push button stations and enclosures. The heavy cast construction of enclosures provides ample protection against accidental damage to control units. Blue-gray enamel finish adds to the attractive appearance.

Here's a Real Spring Winder!

No. 1 Capacity 0 thru 3/32" wire, \$1.25
No. 2 Capacity 0 thru 3/16" wire, 2.50
No. 3 Capacity 0 thru 5/16" wire, 5.00



HJORTH LATHE & TOOL CO.

Will Earn Its Cost In One Day
The HJORTH Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

12 BEACON STREET
WOBURN • MASS.

Castings
grey iron.

Machine
closure

manufac-
flexibility
Controller

control

Mill-
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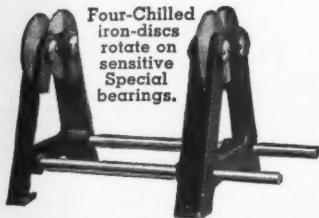
Improved
Anderson
Balancing
Ways

No Leveling
Required

A simple and
excellent de-
vice for bal-
ancing,
straightening
and trueing.

They are made in
the following sizes:

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



Write for Full Information

Made
by Anderson Bros. Mfg. Co.
1926 Kishwaukee St.

Rockford, Ill.

BURKE Milling Machines



No. 4
Motor Driven
Milling
Machine
•
Mounted on
Cabinet
Column
•

Burke motor driven
milling machines
Nos. 1, 2, 3, and 4
are specially suited
for handling small,
difficult work on a
production basis.

Write for complete information.

BURKE MACHINE TOOL CO.
297 E. 16th St.

Conneaut, Ohio

LIBERTY GRINDING ATTACHMENT

Gives Your Surface Grinder
an Extra Hand



Easily attached to most surface grinders to eliminate expensive set-up time where small wheels are necessary. Grinds slots, recesses and surfaces, etc., which are impossible to reach with large grinding wheel.

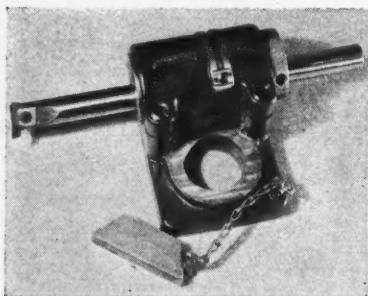
Accurately handles a wide variety of tool, gage, die and other grinding jobs. Assembled complete with any size bores, pulleys, belts and grinding wheels at no extra cost.

Write — specifying diameter of spindle head, type and make of grinders.

Liberty Tool & Gage Works
235 Georgia Ave. • Providence, R. I.

Enclosures are available for 3, 6, 9, 12, and 16 push button, selector switch or pilot light control units. Each may be furnished as an assembled station or as an enclosure only, in which the machine tool manufacturer can fit units from stock to fill his immediate needs. Closing plate assemblies are provided for unused openings in the cover plate.

Enclosures consist of a cast iron case, gasket, and steel cover plate, drilled to accommodate standard drip-tight control units. The case may be drilled and tapped to provide for the entrance of the conduit in five locations.



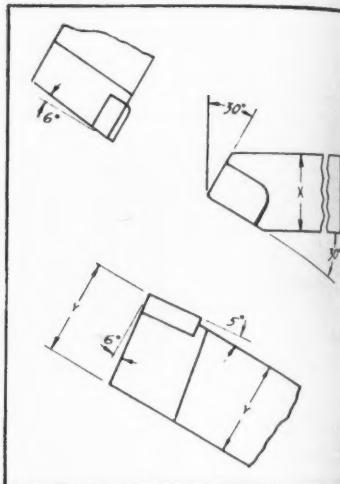
The Everede Boring Bar Holders are adjustable to fit various size lathes. (Bushings are furnished with each boring bar for use in the Holders.) Everede Holders keep the boring bar in a horizontal position, regardless of any change in the size of the lathe, within limits. • The No. 1 Holder for lathes from 7" swing to 9"; • The No. 2 Holder for lathes from 8" swing to 12"; and the No. 3 Holder on engine lathes from 12" swing to 24".

Send for descriptive folder.

EVEREDE TOOL CO.
WILLIS STUTSON
180 N. WACKER DRIVE, CHICAGO
Representatives in principal cities

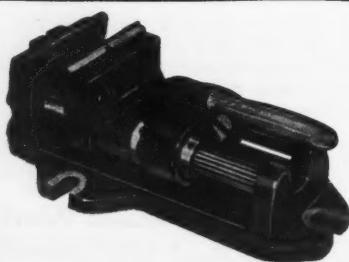
Kennametal Tools for Turning and Facing

A standard series of Kennametal Tools in large turning and facing styles for heavy machining has been developed



Kennametal Tool for Turning and Facing

by the McKenna Metals Co., 300 Lloyd Ave., Latrobe, Pa. The position of the tip in the shank (see illustration) provides a greater thickness of steel under the cutting point of the tip and permits the top surface or chip breaker to be ground without the necessity of grinding away steel. In addition, during the life of the tool, the height of the cutting point is said to be retained rather than being lowered each time the tool is ground.



Quick-Acting PRESTO - VISE

Sliding jaw is moved up to work with lever in raised position. Lever is then pressed downward to exert desired pressure on part being clamped. To release, lever is raised which disengages clutch and slide moves away from work. Write for complete details.

D. A. SMITH & CO.
8085 LIVERNOIS
DETROIT, MICH.

Turning

Kennametal
acing style
n developed



This machine quickly stamps details and serial numbers into name plates.

Write for Particulars

GEO. T. SCHMIDT, Inc.
1806 Belle Plain Ave. Chicago, Ill.

An illustration featuring a catalog titled 'HASSALL CATALOG NO. 40'. The catalog cover is dark with white text. Below the catalog are several metal products: a large bolt and nut, a smaller screw, and a rivet. The text 'Special COLD FORGED PRODUCTS' is visible on the catalog cover. The background has radial hatching lines.

Write Today

JOHN HASSALL, INC.
CLAY AND OAKLAND STS.
BROOKLYN, N.Y.

DIAMONDS FOR DEFENSE



FOUR FIELDS FOR VICTORY
ON LAND - IN THE AIR - ON THE SEA
and - IN THE SHOPS



WIN THE BATTLE OF PRODUCTION WITH KARELSEN DIAMOND TOOLS

Better Quality - Faster Service



SALESMEN WANTED

Write for Territory. Big demand for our products. State qualifications fully. All information in confidence.

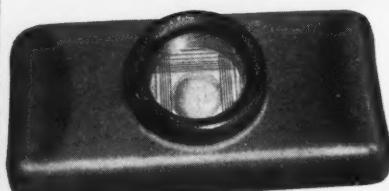


E. KARELSEN, INC.

ESTABLISHED 1852

54 W. 45TH ST., NEW YORK, N. Y. Tel. VAN 6-5688

"All-Way" LEVEL



The FELL Precision Level is made to show the level of all ways at once. This eliminates disturbing the first level when leveling the second. Graduations are in .0005" per foot and form squares about a circular bubble, thus giving co-ordinate readings and showing direction and amount of slope, if any.

MADE IN TWO SIZES
5 1/2" x 12" 3 1/2" x 6"

Write for Bulletin

WM. B. FELL CO.
702 SOUTH ST. ROCKFORD, ILL.

Counterbores High Speed Back Spot Facers Core Drills Flue Sheet Cutters

Interchangeable
and Solids
Also Specials

Write for Catalog

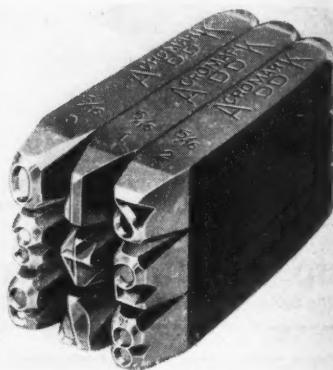


BICKNELL - THOMAS COMPANY
GREENFIELD • MASSACHUSETTS

Tools of this design are available in all turning and facing styles and in all shank sizes of 1 inch and larger.

Acromark Double Duty Steel Letter and Figure Stamps

Steels as hard as Brinell 330 Rockwell "C" Scale 40 can now be successfully stamped, it is claimed, by the use of the double duty steel letter and figure stamps now being marketed by The



Acromark Double Duty Steel Letter and Figure Stamps

Acromark Corp., 251-257 N. Broad St., Elizabeth, N. J. Characters have an unusually heavy bevel and great depth and are individually engraved and hand finished for accuracy. The business end of each stamp is tapered to the character, thus enabling the user to readily locate characters where desired in stamping.

Hardened, tempered, and individually tested, Acromark Double Duty Steel Letter and Figure Stamps are now being used to cold stamp steels that were formerly stamped hot, thereby eliminating the slow operation of heating each part to white heat and thus preventing possible loss of parts due to heat cracks and decarburization.

Acromark Brass Embossing Dies

The Acromark Corp., 251-257 N. Broad St., Elizabeth, N. J., is now marketing brass embossing dies for use in embossing designs and letters into soft brass.

available in
and in all
larger.

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0 Rockwell
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use of the
and figure
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SHEAR IT CLEVERLY
with a
BEVERLY



Cuts!

STRAIGHT — CURVES — ANGLES

Beverly Throatless Shears cut metal flatly—ACCURATE—no waste, no distortion. Made of finest steel—PROFITABLE—INEXPENSIVE! Will last a lifetime! No. 1—cuts 14 gauge—wt. 16½ lbs. No. 2—cuts 10 gauge—wt. 33 lbs. No. 3—(With ball bearing holdown device) cuts $\frac{1}{8}$ inch mild steel and 10 gauge stainless steel, wt. 55 lbs.

BEVERLY SHEAR CO.

3004 W. 111th St. Chicago, Ill.



Units can be furnished in conventional motor speeds from 600 to 3600 R.P.M. in both single and two speed motors to give a wide speed selection.

THE LIMA ELECTRIC MOTOR COMPANY
LIMA, OHIO

Builders of Lima Gear Shift Drives

U. S. A.

**YOUR FIRST LINE OF
DEFENSE against**

**HIGH
SHARPENING
COSTS**
No. 57T

Automatically

Sharpeners

Metal Saws in

gangs up to 6"

in diameter.

Takes gangs up to

3½" thick. The saws

are automatically in-
dexed and sharpened
within variation of
plus or minus .001 of
exact diameter of
entire lot.

*Write for
Folder 57T.*



THE WARDWELL MFG. CO.
3165 FULTON ROAD CLEVELAND, OHIO

New!
Lima Magnetic Polishing Lathe

The LIMA ELECTRIC MOTOR Co., as their latest contribution to industrial "SPEED UP FOR DEFENSE," have developed a new Magnetic Polishing Lathe to meet the demand for handling small steel parts, difficult to hold in the conventional Lathe Chuck or Collet.

This unit will handle steel parts from 2" to 5" in diameter and face plate of Magnetic Chuck is interchangeable to accommodate different sizes and shapes of parts. Magnetic Chuck is mounted on motor shaft and D.C. supply for chuck is self-contained.

copper, zinc, tin, aluminum, and terne plate name plates, instruction plates, shipping tags, identification tags, and so on. The illustration shows two sets



Acromark Brass Embossing Dies

of dies, one with inserts to emboss fire extinguisher name plates.

To use, the male die is screwed to a die shoe and the female die to a holder in the ram of a press. At each stroke of the press, a complete embossing results. The dies can be adapted for use in any punch press and several interchangeable sections may be assembled for use at one time.

Carbozite Standard "Black-out Black"

Said to meet all authoritative specifications and recommended practices and feature easy removal as well, a black-out coating for industrial plant windows and skylights has been placed on the market by the Carbozite Corp., First National Bank Bldg., Pittsburgh, Pa. The material, which is known as Carbozite Standard "Black-out Black," is a smooth flowing liquid coating manufactured from a pyrobitumen ore especially refined and mixed with quick drying volatile solvents and a secret ingredient which is said to provide complete opacity and an absolutely gloss-free surface. Of particular importance is the ease of application and unusual durability of the material even under the most severe corrosive conditions.

Carbozite Black-out Black can be sprayed or brushed on quickly. According to the manufacturer, only one coat is required to assure complete protection against light penetration. Drying is completed in six to eight hours, leaving a dead black, gloss-free coating that is said to be as nearly totally non-reflective as can be obtained.

BRADY - PENROD *Replacement* Centrifugal COOLANT PUMPS!



Eliminate time lost - keep machines operating full force - for replacement pumps, use BRADY-PENROD Coolant and Circulatory pumps - motor driven open impeller centrifugal type.

Bolting pumps to machines unnecessary, pipe connections alone are usually sufficient.

LOW COST
Capacities are automatically controlled by pipe sizes ranging from $\frac{3}{8}$ " copper tubing with 1 gal per min. to 1" pipe with 20 gal per min. - using $\frac{1}{2}$ H.P. Motor 220 V 3ph 60 cycle

\$40

BRADY - PENROD, INC. MUNCIE, IND.

Black-out

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Cor., First
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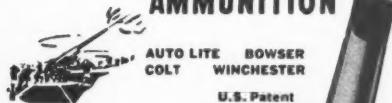
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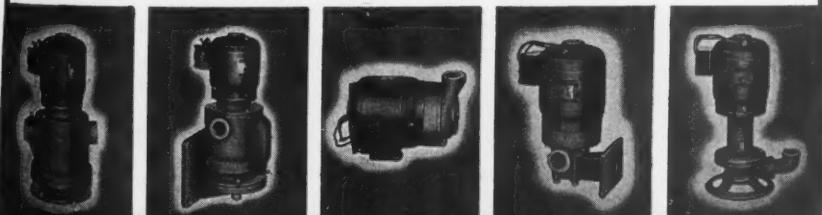
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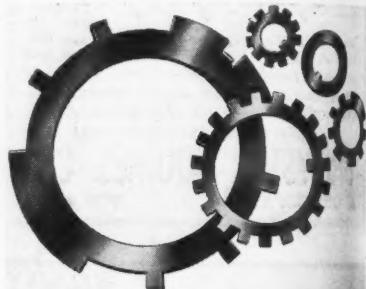
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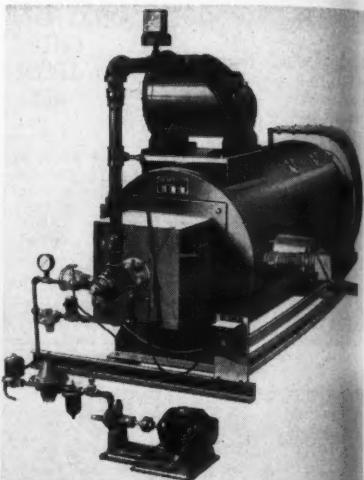
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Said to fill every requirement for a convection type oil heater, the Despatch Direct Fired Oil Heater shown herewith has been placed on the market by the Despatch Oven Co., 622 9th St., Minneapolis, Minn. Features of the heater



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include a proportioning type burner which permits absolute control of air-oil ratio at all settings. The burner, which is designed for efficient operation with all grades of oil, is set into burner tile and can be removed whenever necessary. A special Despatch feature allows for easy change-over from oil to gas when required. A combination oil and gas burner for alternating requirements is also available.

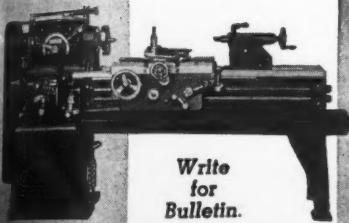
The Despatch Direct Fired Oil Heater is provided with an extra heavy, reinforced, double walled, insulated heater body. To attain highest possible efficiency of heat course from combustion chamber to mixing chamber to fan, the heater is provided with an adjustable air intake and recirculating intake which properly proportion the new products of combustion and recirculated heated air. A radiation shield in the mixing chamber protects the heater

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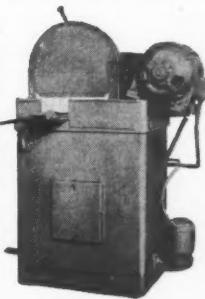
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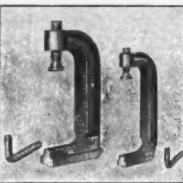
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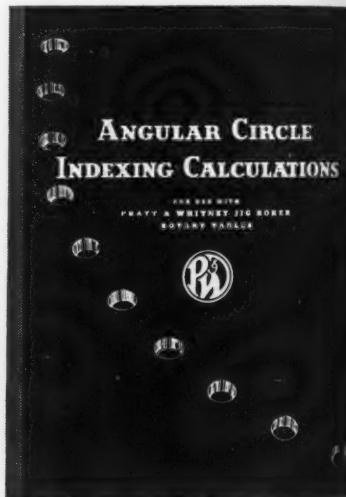
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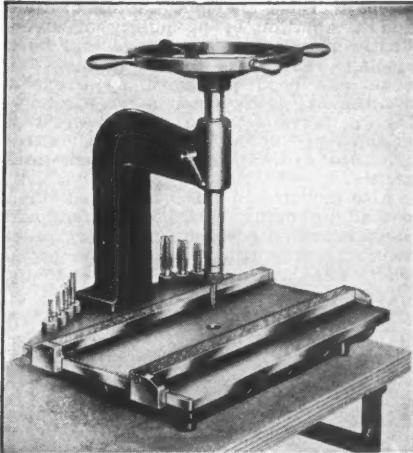
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Shop Literature

Studebaker Hydraulic Visepress for production, toolroom, and maintenance work is the subject of a six-page profusely illustrated and descriptive folder released by the Studebaker Machine Co., 9 S. Clinton St., Chicago, Ill. The folder covers the operations, application, construction, specifications, and features of the unit. Copy free upon request.



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The die list, tabulating inside and outside dimensions, emphasizes the availability of variable lengths below and up to maximum length specified without special dies. Included in the die list are illustrations of self-aligning bearings and special shapes, such as gears, sprockets, and other unusual shapes, to indicate the broad adaptability of "Compo" Porous Bronze material to other than standard shapes. Copy of Die List No. 18 free upon request.

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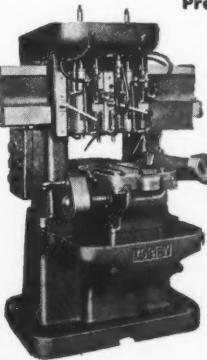


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"Precision Toolroom Tapping" is the title of a four-page illustrated folder now being issued by The Viking Tool & Machine Corp., 2 Main St., Belleville, N. J., giving important features, specifications, and so on, of the Viking Tapper. Copy free upon request.

Mid-West Grinding Wheels. A catalog containing complete information on the line of grinding wheels and other solid abrasive products marketed by the Mid-West Abrasive Co., 2189 Beaufait Ave.,

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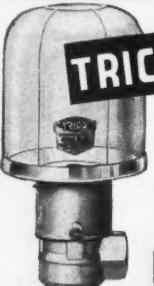
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South Bend No. 2-H Turret Lathe Designated as the No. 67-T, a four-page bulletin illustrating and describing the South Bend No. 2-H Turret Lathe has been announced by the South Bend Lathe Works, Dept. 4Z, South Bend, Ind. Complete specifications are given and construction features shown in the bulletin, which is designed for convenient filing for ready reference. Copy free upon request.

"Blackout Twins" is the title of a folder giving timely, up-to-the-minute information on interior and exterior Blackout Cold Water Paints as manufactured by the Tamms Silica Co., 2 N. La Salle St., Chicago, Ill. Copy free upon request.



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Chisholm - Moore "Meteor" Electric Hoist. The Chisholm-Moore Hoist Corp., Tonawanda, N. Y., announces a 28-page catalog covering the CM "Meteor" Heavy Duty Electric Hoist. The catalog completely describes all the features of the hoist, and illustrations are used throughout to picture practically every advantage. The catalog includes a large, colorful illustration of the hoist, detail drawings of the hoist, all types of suspension and trolley arrangements and a list of accessories that are available. Copy free upon request.

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Medart V-Belt Catalog. An informative catalog on V-drive belts and sheaves is now being issued by The Medart Co., Potomac and De Kalb Sts., St. Louis, Mo. The catalog includes pertinent information regarding the selection, installation, and care of V-belt drives for maximum service and contains simplified tables for the selection of V-belt drive combinations. Prepared in non-technical form but technically correct, these tables are designed to eliminate the complex mathematics otherwise necessary for the computation of sheave and belt combinations to

fit specific drive problems. Copy of catalog free upon request.

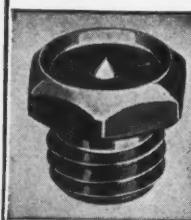
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Dia-Tools. Dia-Tool, Inc., 320 Yonkers Ave., Yonkers, N. Y., has published a 16-page booklet illustrating and describing its line of Dia-Tools (diamond tools with diamonds set in sintered tungsten carbide), including the new Series A Special line of tools. The booklet contains details about the permanent setting of small and large diamonds as well as about the company's resetting service. The booklet also contains general operating instructions so as to enable the user to get the best possible service out of his Dia-Tool grinding wheel dressers. Copy free upon request.

Westinghouse Electric Heating Units and Controls for industrial applications involving the heating of liquids, solids or air are described in a 38-page catalog announced by the Westinghouse Electric & Mfg. Co. Specifications, descriptions, ratings, and prices of the following types of heaters and controls are covered: strip heaters, finned strip heaters, cartridge heaters, Corox water and oil immersion heaters, air and oven heaters, melting pots, glue pots, thermostats, switches, and contactors.

Handy as a reference guide, the catalog contains seven pages of application data and selection information for determining the most suitable types and sizes of electric heating units to meet many industrial requirements. Typical examples of heating problems with the correct solutions are included.

Copy of Catalog 28-000 may be obtained from Dept. 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania.

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Lincoln "Shield-Arc" Welder with self-indicating dual continuous control is the subject of a 20-page bulletin announced by The Lincoln Electric Co., Cleveland, Ohio. The features, construction, operation, application, and so on, of the welder are profusely illustrated and described. Copy of Bulletin 412 free upon request.

"Zinc in War" is the title of a four-page folder prepared for distribution by The New Jersey Zinc Co., 160 Front St., New York, N. Y., describing and illustrating the use of zinc in the manufacture of fire hose, sprayed metal, U. S. Army "Jeep" Cars, tanks, army communications equipment, machine tools, ordnance brass for cartridge and shell cases, fuse parts, and so on. Copy free upon request.

"Stamping Presses, Their Safety Uses and Abuses" is the title of a 16-page booklet published by Junkin Safety Appliance Co., 930 W. Hill St., Louisville, Ky., containing valuable information on the maintenance and operation of stamping presses. This booklet was prepared as guide for use by insurance inspectors, safety engineers, factory inspectors, plant superintendents, shop foremen, and various other men directly responsible for the safety of press operations. Copy free to any plant executive upon request.

Ryerson Booklet on S.A.E. and A.I.S.I. Analysis Comparison. Most timely and helpful is a booklet published by Joseph T. Ryerson & Son, Inc., comparing the S.A.E. (Society of Automotive Engineers, Inc.) and A.I.S.I. (American Iron and Steel Institute) systems of steel identification.

The booklet contains all the latest of official data for both of these new systems of identification. Direct comparisons of the equivalent or alternate steels are given in tabular form. The S.A.E. and A.I.S.I. systems are explained. Complete analyses are listed, and the average physical properties of A.I.S.I. and S.A.E. steels are given in their proper relationship.

Copies of the booklet may be obtained from Ryerson Steel-Service plants in Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, and Jersey City.

February, 1942

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Have several advantages. Alignment is easily obtained and maintained. For circular punches and dies they are particularly economical and for irregular shapes they can be handled as conveniently as other types. Our Booklet on Sub-Presses and Dies shows when they should be used. Ask for it.



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Campbell No. 425 Cutalator, an oscillating type abrasive cutting machine, is profusely illustrated and described in a four-page folder released by the Andrew C. Campbell Division of American Chain & Cable Co., Inc., Bridgeport, Conn. Copy free upon request.

Meehanite. A complete Wire-O bound catalog on Meehanite castings, describing their manufacture, metallurgy, and engineering properties, has been published by the Meehanite Research Insti-

tute of America, Inc., 311 Ross St., Pittsburgh, Pa. The catalog contains 47 pages of facts important to engineers, designers, machinery manufacturers, and every user of castings.

Copy of the catalog will be sent free of charge to mechanical executives addressing a request on their company letterhead.

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Simple Blue Print Reading with Special Reference to Welding. Second edition. Published by The Lincoln Electric Co., Cleveland, Ohio. 146 pages, $5\frac{1}{2}$ x $8\frac{1}{2}$ inches; 96 drawings. Semi-flexible simulated leather cover, gold embossed. Price, 50 cents per copy postpaid anywhere in U. S. A., 75 cents elsewhere.

This book is concisely written in simple, practical language for easy understanding, and is intended for welders, mechanics, and others who, by a few hours spare-time reading, can learn blueprint reading which otherwise might take many months to learn. More than 50 drawings have been revised in this new edition, which also contains eight new pages of drawings in addition to those previously used.

The text gives the student a clear understanding of symbols used in drawing various types of welded joints, including butt, corner, fillet, and lap welded joints. The illustrations contained in the book include practical examples of drawings of a number of machine parts, pipe connections, general construction, tanks, and so on. A list of questions and answers enables the student to test his knowledge.

The book also covers thoroughly and clearly the essentials of general blueprint reading, discussing "showcase views," perspective drawings, "line of sight" projection of views, and the line "alphabet."

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Oakite News Service Vol. XXV, Nos. 11-12. In view of defense demands for greatly accelerated output of munitions, a five-page illustrated feature article appearing in Vol. XXV, Nos. 11-12 edition of Oakite News Service, house organ of Oakite Products, Inc., 57 Thames St., New York, N. Y., is of timely interest since it describes how new cleaning materials and methods are successfully helping speed up shell production.

The article gives considerable data on cleaning high explosive, anti-aircraft and Howitzer shells ranging in size from 75 to 155 mm. before inspection and painting either by mechanical washing machine or tank cleaning methods. In this connection, the characteristics and qualities required of materials used in this work are also reviewed.

Among the important, closely related factors discussed which influence production quality and output of shells, are the effect of drawing lubricants and cutting fluids on subsequent cleaning operations, the simplification of cleaning through new production techniques, and the prevention of rust formation on steel shells after cleaning.

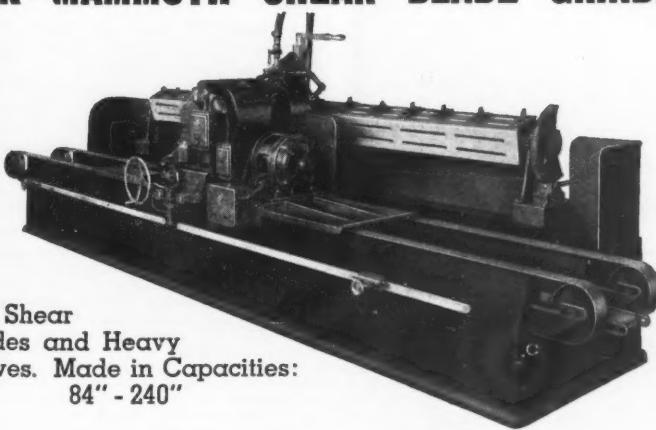
Superintendents and foremen of plating departments and contract finishing shops will also be interested in another

article appearing in this edition of Oakite News Service which describes and illustrates the plating of aluminum, brass, and Invar metal radio condenser parts to micrometer tolerances. Copy of Oakite News Service free upon request.

Shepard Niles Electric Hoists. A 48-page profusely illustrated catalog devoted to Shepard Niles Electric Hoists and designated as the No. 127 has been prepared by Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y. The catalog contains valuable information on adaptability and application of the hoists as well as on mechanical details. It also lists speeds, lifts, dimensions and other data useful to the plant executive or engineer when planning a material handling system. Copy free.

"Select the Correct Wire Rope" is the title of a four-page folder released by the Macwhyte Co., 14th Ave., Kenosha, Wis., which describes and illustrates various types of Macwhyte Wire Ropes for use on shovels, draglines, cranes, scrapers, and other excavating equipment. Copy free upon request.

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Westinghouse Electric Furnace Folder F-8541. A six-page illustrated folder giving details of the Westinghouse Die Hardening Electric Furnace with ammonia atmosphere for bright hardening of dies and tool steel has been prepared for distribution by the Westinghouse Electric & Mfg. Co., Dept. 7-N-20, East Pittsburgh, Pa. Copy free upon request.

Johnson "Ledaloy" Data Sheets. In response to many requests, the Johnson Bronze Co., 590 S. Mill St., New Castle,



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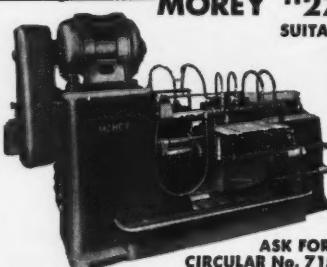
W.M. S. YOHE SUPPLY CO.
505 Gibbs Ave. N. E., Canton, O.

Pa., has commenced publication of data sheets dealing with "Ledaloy"—a self-lubricating sintered bearing. The first three sheets, which are now available free of charge, discuss: (1) method of installation; (2) operating temperature and contraction and expansion, and (3) chemical and physical characteristics of Johnson "Ledaloy" Self-Lubricating Bearings.

"Airco Electric Welding Products," a 32-page illustrated catalog now being issued by Air Reduction Sales Co., 6 E. 42nd St., New York, N. Y., describes the complete line of Airco electrodes and Wilson electric welding machines marketed by this firm. The catalog discusses various types of electrodes and offers suggestions as to where each type electrode can be used to best advantage. Included in the description of each electrode is: (1) a general description; (2) suggested applications; (3) welding procedure; (4) physical properties, and (5) a specification table.

Another section of the catalog is devoted entirely to electric welding accessories. Among the items covered are aprons, brushes, cable, graphite electrodes, face shields, leather gloves, goggles, helmets, electrode holders, and many others. The products in this section are conveniently arranged for quick reference.

A page of excerpts from "Welding Symbols and Instructions for Their Use" as published by the American Welding Society is another feature included in the catalog. The concluding section offers a detailed discussion of various Wilson electric welders, including the "Hornet," "Yellow Jacket," Model MCT, and Model GA. Copy of Catalog No. 103 free upon request.



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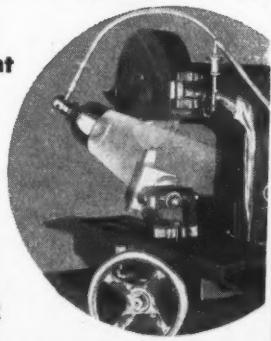
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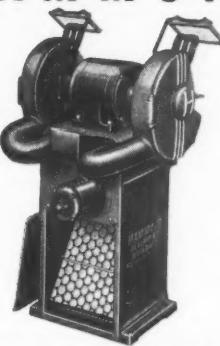
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February, 1942

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Eastern Branch, 71 W. 23rd St., New York City

Practical Arc Welding. By W. J. Chaffee. Published by Hobart Trade School, Inc., Troy, Ohio. 516 pages, 512 illustrations. Flexible red Fabrikoid cover. Price, \$2.00 postpaid anywhere in the United States.

According to the publisher of this book, arc welding today is the United States' seventh largest industry and the Allies' most important defense tool. Tanks, guns, planes, ships, and military vehicles are now completely arc welded. Add to this tremendous program the abnormal amount of arc welding performed in all places where metal is joined, and the importance of arc welding in American industry is obvious.

The result of the sudden acceleration of welding activity has been an unprecedented demand for trained welding personnel. Even experienced welders find that they must keep abreast of modern procedures and techniques at all times so that they may successfully perform the increasing variety of jobs they daily must accomplish. For these reasons, this book, "Practical Arc Welding," was written.

Part I of the book is devoted to general welding information. Material covered includes the growth of arc welding; where arc welding is used; manu-

facturing applications; available metals and alloys; discussion of joints and welds; electrodes and filler rods; strength of arc welded joints; cost of arc welding; characteristics of the welding arc; welding symbols and their use; equipment for arc welding, and development of welding personnel.

Parts II and III of the textbook are devoted to a complete series of arc welding lessons exactly as they are offered in the Hobart Trade School. This group of 41 lessons covers preliminary instructions; starting and manipulating the arc; common joints with bare electrodes; welding light gauge sheets with coated electrodes; welding with coated rods in all positions; pipe welding; welding cast iron; special tests; welding with the carbon arc; "long arc" method of welding copper, and specialized applications of arc welding.

Parts IV and V contain a complete dictionary of welding terms and 20 pages of helpful tabular data for operators and designers. The book also has an eight-page cross reference index for the reader's convenience.

Welders, potential welders, students, instructors, designers, and engineers should find the text invaluable for reference or home study work.



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Motion Pictures On Lathe Operation

To speed up the training of lathe operators for national defense industries, the South Bend Lathe Works has sponsored the production of a series of 16 mm. sound motion pictures in full color based on the book "How to Run a Lathe." Professionally filmed by Burton Holmes Films, Inc. at the South Bend Lathe Factory, these pictures show practical shop methods as practiced in modern industrial plants. Showing time for each of the two 800 feet reels now complete is approximately 20 minutes.

The first reel entitled "The Lathe" clearly shows the apprentice what a lathe is, what a lathe is for, and how the various parts operate. Important lathe operations, including turning, facing and thread cutting, are demonstrated. The second reel, "Plain Turning," shows in detail each operation performed in the machining of a straight cylindrical shaft between the lathe centers.

Close-ups show locating and drilling of center holes, adjustment and setting of cutting tools, use of cross feed graduations, use of calipers and micrometers, use of quick change gear box, changing speeds, and operation of the lathe carriage and apron.

Factory apprentice schools, vocational



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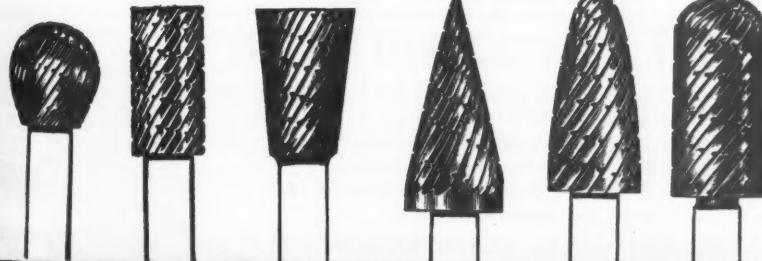
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al schools, Army and Navy training schools, colleges and high schools teaching machine shop practice will find these films helpful in training lathe operators. Complete information on securing the use of these films can be had by writing to South Bend Lathe Works, Dept. 4Z, South Bend, Indiana.

"Metal-Cutting Methods" is the title of a compact handbook now being issued by the Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass., telling metal-cutting saw users how they can obtain more production from their saws. Copy free to users of metal-cutting saws upon request.

P&H Hansen WD-150 Square Frame Arc Welder is the subject of Bulletin W-28 which is now being distributed by the Harnischfeger Corporation, 4535 W. National Ave., Milwaukee, Wis. The operating features of the welder plus details on the unit's square frame design are discussed and illustrated. A description of the multiple welding service obtained from the parallel hook-up of two or more machines is also in-



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cluded in the bulletin, copy of which can be obtained free upon request.

Thor No. 52 Pneumatic Tool Catalog. Eight new pneumatic tools are featured in the Thor No. 52 Pneumatic Tool Catalog, 1941 edition, now ready for distribution by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. The new Thor tools consist of right angle and close corner drills, right angle nut setters and screw drivers, bolt wrenches, grinders, chipping hammers, sanders, and saws.

The Thor No. 52 Catalog is fully illustrated and gives complete specifications on the entire line of Thor pneumatic tools and accessories, including rotary and piston air drills, close corner drills, wood boring machines, wrenches and heavy tube rollers, rotary brushes, grinders, nut setters, screw drivers and tappers, core and rivet busters, chipping, riveting, scaling and staybolt hammers, balancers, motor hoists, hold-down, bench and floor rammers, rivet sets, rivet squeezers, sanders, saws, and grinding, sanding, riveting and other accessories. Copy free upon request.

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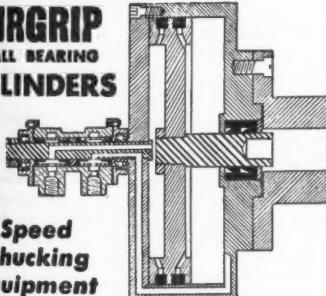


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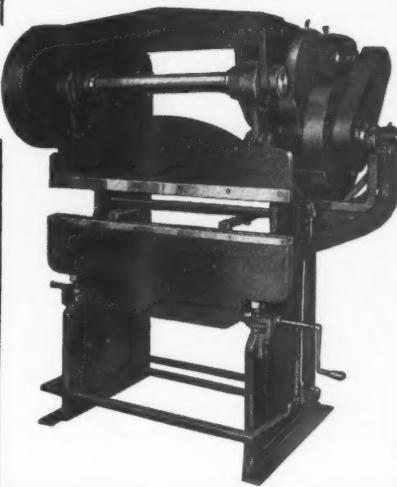
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Tamms Pyramid Instruments. A line of pyramid instruments for use in measuring temperatures of various type furnaces, ovens, metals, and so on, is announced in a four-page bulletin, designated as No. 401, which is now being distributed by the Tamms Silica Co., 228 N. LaSalle St., Chicago, Ill. Copy free upon request.

Johnson "Ledaloyl" Bearing Catalog L-3. Published by the Johnson Bronze Co., 590 S. Mill St., New Castle, Pa.,

this 36-page catalog lists over 2,000 standard stock sizes of Johnson "Ledaloyl" Self-Lubricating Bronze Bearings and Bushings.

Pages 2 to 8 of the catalog contain important Ledaloyl bearing data. The succeeding pages include progressive size listings of Ledaloyl plain bearings and bushings, flanged bearings and bushings, and spherical bearings. At the rear of the catalog is a helpful decimal equivalent chart. Copy of Catalog L-3 free upon request.

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3605 Carew Tower, Cincinnati . . . (MAin 3724)

Allis-Chalmers Directory of Engineering Aids. For the first time, the Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has issued a complete directory of engineering literature, bulletins and the hundreds of different products that it makes. Prepared in the form of a handy-sized 32-page book, the complete 1940 directory lists in numerical order more than 350 separate bulletins and other engineering aids now available from the factory on request. These include 280 different items on power, electrical, and industrial machines produced by the company; about 40 instruction books and repair part bulletins, and 38 catalogs and folders on tractors, farm equipment, and road machinery.

Immediately following a brief foreword and instructions for use is a list of Allis-Chalmers manufacturing plants in seven different states, with a list of district offices here and abroad and foreign sales agencies.

The directory lists 1,610 different and widely diversified products that Allis-Chalmers makes and, also, in a separate chapter lists 96 trade names of company products, 20 of which are registered trade marks. Copy free to any mechanical executive who will address a request on his company letterhead.

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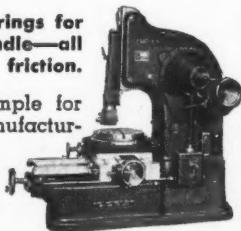
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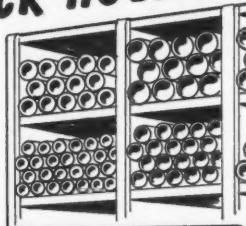


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"Tool Steel for the Non-Metallurgist." Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y., is now distributing a 32-page booklet entitled "Tool Steel for the Non-Metallurgist." The booklet consists of a series of articles explaining the characteristics of the different types of tool steels, outlining the purposes for which each is best adapted, and giving suggestions for heat treatment. Copy free upon request.

Wagner Motor Bulletin MU-183. The Wagner Electric Corp., 6400 Plymouth

Ave., St. Louis, Mo., has published a 34-page bulletin on single-phase, direct-current, and small polyphase motors. Designated as MU-183, the bulletin contains detailed descriptions of the construction of repulsion-start-induction motors, repulsion-induction motors, capacitor-start motors, split-phase motors, direct-current motors, small polyphase motors, fan motors, and explosion-proof motors.

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Firthite Sintered Carbide Cutting Tool Users' Handbook. Firth-Sterling Steel Co., McKeesport, Pa., is now issuing an informative 64-page Wire-O bound handbook on Firthite Sintered Carbide Cutting Tools. The handbook is divided into five sections. Section 1 is devoted to Firthite and contains information on the nature and uses, adaptability, forms available, grade selection, grades available, and properties and uses. Section 2 deals with general purpose tools, covering styles and grades, specifications, and adapted uses.

In Section 3, the four steps followed in making Firthite Sintered Carbide Cutting Tools with standard machine shop equipment are illustrated and described. These steps consist of forming, recessing, brazing, and grinding operations. Section 4 contains information on the application and maintenance of Firthite Sintered Carbide Tools, and in Section 5, handy data such as a hardness conversion chart, table of recommended symbols, table of decimal equivalents, metric conversion table, speeds and feeds chart, and cutting speed conversion table are included.

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Gast Air Pump Catalog. A loose-leaf catalog containing information on the Gast line of rotary air pumps and compressors, including the new Gast V-belt Driven Air Pump, has been issued by the Gast Mfg. Corp., Benton Harbor, Mich. In addition to illustrations and detailed descriptions of the various models, the catalog presents specifications, engineering data, and performance tables for 10 sizes of Gast Rotary Air Pumps, $\frac{1}{2}$ to 23 c.f.m., vacuum to 28 inches, and pressures up to 30 pounds.

The catalog also includes a section illustrating and describing the use of Gast Rotary Air Pumps and Compressors in industry and as standard equipment on many types of machines. Copy free.

Thor High Frequency Electric Tool Catalog No. 61. Nineteen new models of high frequency electric tools are shown in the Thor High Frequency Electric Tool Catalog, 1941 edition, now ready for distribution by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. The new models consist of balancers, drills, grinders, nut setters, the "Pix-Up" Finder, polishers, rubbers, sanders, and screw drivers. Considerably larger than the previous edition, the No. 61 Catalog contains a complete section on balancers, is fully illustrated by tool and action pictures, and includes complete specifications on all Thor High Frequency Electric Tools. Copy free.

Lubriplate Film No. 8-40. This eight-page bulletin, one of a series of bulletins published at intervals by the Lubriplate Division of Fiske Brothers Refining Co., Newark, N. J., under the title of "The Lubriplate Film," describes in detail the use of Lubriplate lubricants in the metal-working industry. The bulletin contains several illustrations showing various types of machines in which Lubriplate is used. Copy of Lubriplate Film No. 8-40 free to mechanical executives upon request.

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"Zinc in Defense." Prepared by The New Jersey Zinc Co., 160 Front St., New York, N. Y., this four-page illustrated publication explains the myriad uses for zinc in the Defense Program; namely, in the manufacture of paints for shells, cannon, ships, and so on, in the manufacture of brass for cartridges, shells, fuses, and so on, in making boiler plate for ships, in the galvanizing of steel roofs for camp buildings, and various other uses. Copy of "Zinc in Defense" free upon request.

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Severance Tube-Burring Cutters. Cutters designed for burring, reaming, and tube facing are illustrated and described in Bulletin 12-T now being distributed by the Severance Tool Mfg. Co., 1516 E. Genesee Ave., Saginaw, Mich. Engineers' drawings showing several combinations in which Severance cutters can be supplied are included. Copy free upon request.

"For That Tough Pumping Job" is the title of a four-page bulletin now being issued by T. Shiver & Co., 810 Hamilton St., Harrison, N. J., illustrating and describing the Shiver Diaphragm Pump for use with corrosive, abrasive, viscous, thick-heavy, and so on, materials. Complete specifications together with several illustrations showing various installations of the pump are included. Copy of Bulletin No. 112 free upon request.

"**Grits and Grinds**" Vol. 32 No. 9 contains in its first few pages an article entitled "How To Get 'Extra Mileage' from Your Twist Drills." The article illustrates and describes the correct methods and set-ups employed in grinding both small and large drills, covering such subjects as Lip Clearance, Angle of Point, Thinning the Web, and Procedure in Sharpening a Drill. A table of grinding wheels recommended for drill sharpening is also included in the article.

Combination Radial Truing and Wheel Forming Device, Development of Norton Abrasives, Part III, and A Special Arrangement for the Norton No. 10-U Lapper are topics of interest also treated in this 12-page edition of "Grits and Grinds," which is available from the Norton Company, Worcester, Mass., free upon request.

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"Finishing Suggestions," a six-page bulletin announced by the Sundstrand Machine Tool Co., Rockford, Ill., contains illustrations on the use of the Sundstrand Hi-Speed Sander, with suggestions as to abrasives and methods found most suitable in performing various metal finishing operations. Copy of Bulletin RM-1 free upon request.

"Rexalloy" Bulletin No. 51. Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y., is now issuing Bulletin No. 51 which consists of five sheets giving factual and practical data on "Rexalloy" — a cast, chromium cobalt tungsten, cutting alloy — as well as "case histories" of Rexalloy's unusual cutting performance. Copy free upon request.

Kimball Safety Products Follo. De-signed for convenient filing, a folio containing a series of four folders entitled "Eye Protection," "Body Protection," "Hand Protection," and "Welders' Supplies" has been prepared for distribution by the Kimball Safety Products Co., 7314 Wade Park Ave., Cleveland, Ohio. Each folder has an index tab printed in an attractive color so as to make it readily available for quick reference.

The folder entitled "Eye Protection" illustrates and describes a complete line of goggles for various purposes. The folder "Body Protection" includes information on various protective

clothing for industry such as trousers, coats, shirts, aprons, sleevelets, leggins, helmets, and so on. The "Hand Protection" folder describes and illustrates numerous types of welders' and work gloves and mittens. In the folder "Welders' Supplies," welders' gloves, sleevelets, aprons, curtains, electrode carriers, goggles, face shields, folding face shields, and so on, are covered.

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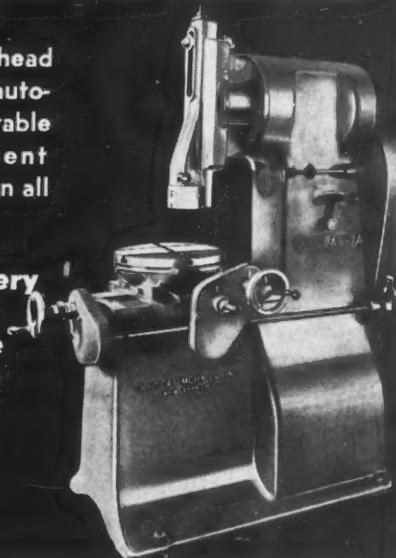
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2. Industrial Diamond Tools

New 16-page booklet issued by Dia-Tool Inc., 320 Yonkers Ave., Yonkers, N. Y., contains details about the permanent setting of small and large diamonds as well as resetting service. Also helpful operating instructions.

3. Magni-Ray

Four-page bulletin fully describing the Scherr "Magni-Ray" Illuminated Magnifier and illustrating a number of its uses in the machine shop has been issued by George Scherr Co., 130 Lafayette St., New York, N. Y.

4. Adjustable Hollow Mills

Kutmore High Speed Adjustable Hollow-Mills is the subject of Catalog No. 15 issued by Carl Wirth & Son, 1625 Clinton Ave., N., Rochester, New York.

5. Grinders

A complete line of Marschke Grinders is illustrated and described in new catalog released by Vonnegut Moulder Corp., 1804 Madison Ave., Indianapolis, Indiana.

6. Milling Head

Circular detailing the Eklind Universal Milling Head may be obtained from the Universal High-Speed Tool Co., 547 W. Washington Blvd., Chicago, Illinois.

7. Carboloy Tool Manual

Carboloy Company, Inc., 11143 E 8 Mile St., Detroit, Mich., has issued 32-page Carboloy Tool Manual GT-133.

8. Milling Machine

The Wigglesworth Machine Tool Co., 193 Bent St., Cambridge, Mass., is offering descriptive literature on the new No. 3 Wigglesworth small milling machine.

9. Magnetic Chucks

A complete line of magnetic chucks is illustrated and described in Catalog W4 issued by the O. S. Walker Co., Inc., Woburn Ave., Worcester, Massachusetts.

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Mid-West Coated Abrasive Products Catalog No. 22. Mid-West Abrasive Co., 2189 Beaufait Ave., Detroit, Mich., is now distributing a 32-page catalog containing complete information, including list prices, on its line of coated abrasive products, which includes various types of belts, discs, rolls, sheets, reams, and so on. Copy free upon request.

Operator's Handbook. A 96-page booklet presenting helpful data for obtaining maximum service from truck tires, to be known as the Operator's Handbook, has been published by The B. F. Goodrich Co., Akron, Ohio. The main feature of the booklet is a 15-page section dealing with "Factors Governing Truck Tire Service."

Included in a special section of the booklet are charts and tables portraying the value of proper inflation and loads, the dangers in over and under-inflation, mis-matching of dual tires, causes of uneven tread wear, and the effect of overloads and excessive speeds in generating heat—prime enemy of rubber. These and other factors are summarized in 20 practical rules showing

truck operators how to obtain maximum service life from their truck tires. Copy of booklet free to truck operators upon request.

Jessop Silver-Ply Stainless-Clad Steel. A 16-page price list for Silver-Ply Stainless-Clad Steel has been issued by the Jessop Steel Co., 608 Green St., Washington, Pa. The list contains base prices for sheets and plates of Silver-Ply for 12 grades of cladding, in proportionate thicknesses of cladding from 5 to 50 per cent.

A section on standard classification of extras for plates includes tables on machining, shearing and flatness tolerances, estimated weights, and size limits for standard production plates and sheets. The standard classification of extras for sheets includes extras for finish, shearing, size, quantity, and so on.

The last section of the price list contains prices for forming standard flanged and dished heads, A.S.M.E.-A.F.I. flanged and dished heads, and elliptical dished heads, as well as prices for machining heads. Copy of price list free upon request.



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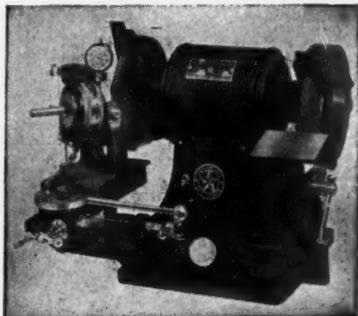
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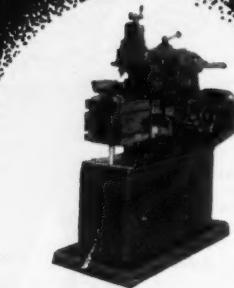
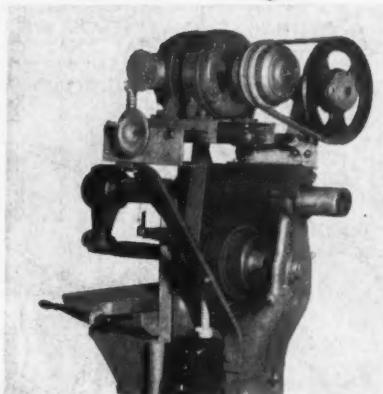
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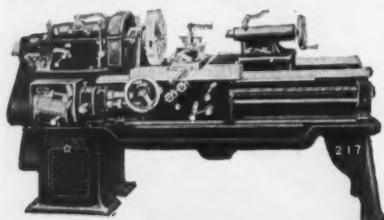
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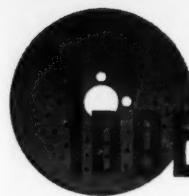
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DIVISION OF THE R. K. LE BLOND MACHINE TOOL CO., CINCINNATI, OHIO

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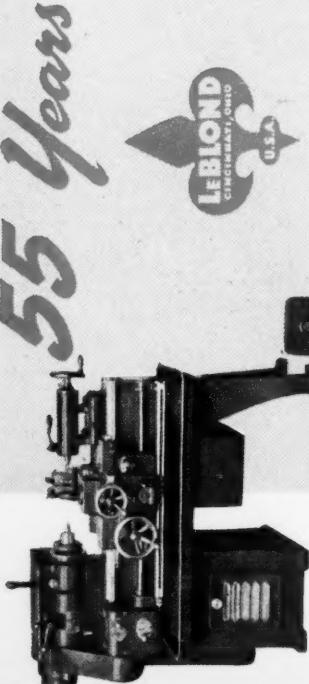


55 Years of Preparation

••• make possible our contribution to defense

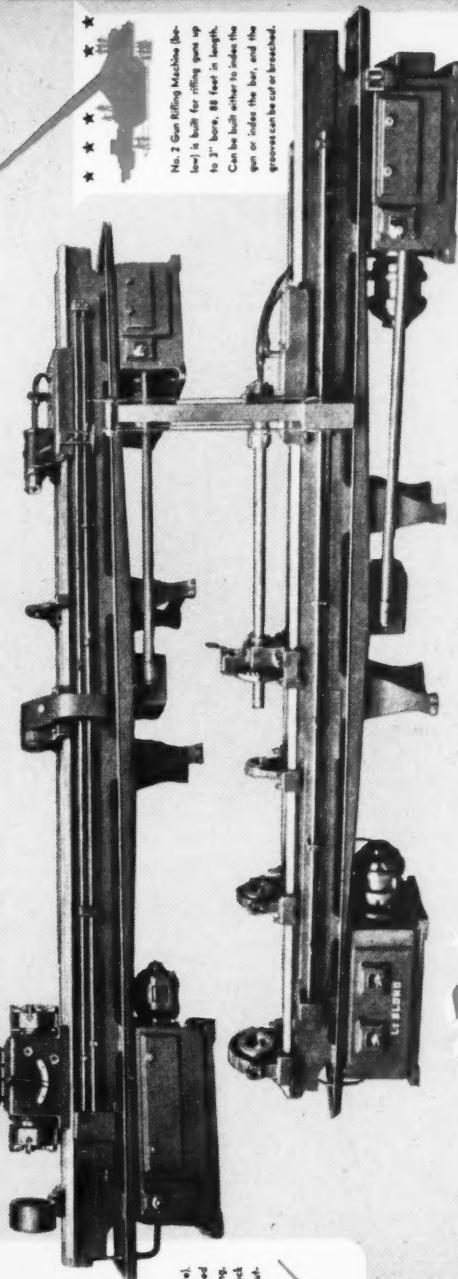
The nation wide acceptance LeBlond lathes enjoy among arsenals and private plants, come as a result of continuous, uninterrupted research and development fostered by our founder, Mr. R. K. LeBlond. Recognized as one of the outstanding leaders of the industry, Mr. LeBlond has sought constantly for better, faster, and cheaper methods of turning metal. Since he first began manufacturing machine tools in 1887, Mr. LeBlond has seen his company acquire over 210 patents protecting many exclusive features that now help so materially to speed our national defense program.

Largest Manufacturer of a Complete Line of Lathes



12" Rapid Production Lathe (above) with high-speed antifriction head; 12" also available with regular antifriction, or high-speed motor headstock; 17" and 20" with 4-speed selective geared headstock.

No. 2 Deep hole borer (above) with powerful, hydraulic feed mechanism, for drilling, boring, and reaming operations on stock any length, and up to $5\frac{1}{2}$ " outside diameter.



No. 2 Gun Boring Machine (below) is built for rifling gun up to 3" bore, 48 feet in length. Can be built either to take the gun or index the bar, and the grooves can be cut or broached.

THE R. K. LEBLOND
MACHINE TOOL COMPANY • CINCINNATI, OHIO

[Machines shown are but two of a complete line of gun manufacturing equipment.]



Completely
Cold
Forged

HOLO-KROME

fibro forged

TRADE MARK

SOCKET SCREWS

SERVING THE NATIONAL DEFENSE PROGRAM

THE HOLO-KROME SCREW CORP., HARTFORD, CONN., U.S.A.

24
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FR
50

MODERN Machine Shop

March, 1942

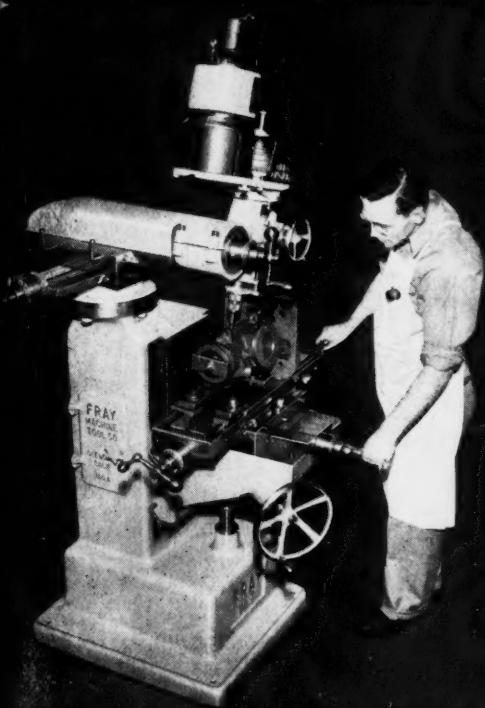
ALL TIER

ONE WORK SET-UP



FRAY

TYPE 7-B
UNIVERSAL
MILLING MACHINES

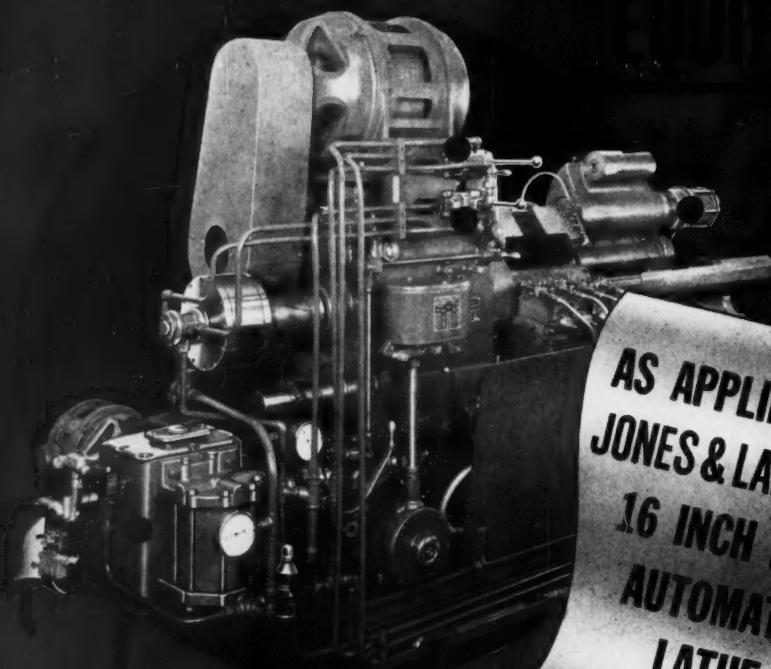


- You can handle every milling, drilling, boring, grinding job — at any angle or compound angle — in horizontal and vertical planes — without changing the work set-up.
- On a Fray "All Angle" Milling Machine you have 10 inches of cross travel above the table. The Turret Head is $11\frac{1}{2}$ " in diameter, machine calibrated the full 360° .
- The Head can be rotated a full 360° in both planes, for any angle or compound angle. The Ram has 10" of in-and-out movement.

FRAY MACHINE TOOL COMPANY
503 W. Windsor Road

Glendale, California

"LOGAN"



AS APPLIED TO
JONES & LAMSON
16 INCH FAY
AUTOMATIC
LATHE

This Jones and Lamson 16" Fay Automatic Lathe is equipped with a "LOGAN" Hydraulic Power Unit, shown at left above. This consolidated model power unit is an entirely independent source of fluid power supply and it assures constant pressure for continuous and efficient operation of the hydraulic cylinders. In addition to the power unit, this Fay Automatic Lathe is equipped with a "LOGAN" Model "HR" Rotating Type Hydraulic Cylinder. "LOGAN" Model

"HA" Non-Rotating Type Hydraulic Cylinder, two Model 40101 Hoses, and "LOGAN" Hydraulic Control Valves, a Model 8915 "LOGAN" Decoupling Valve and accessories to complete the hydraulic circuits. "LOGAN" Representatives and "LOGAN" Engineers will be glad to make recommendations on your problems.

LOGANSPORT MACHINE, INCORPORATED

901 PAYSON ROAD

Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories

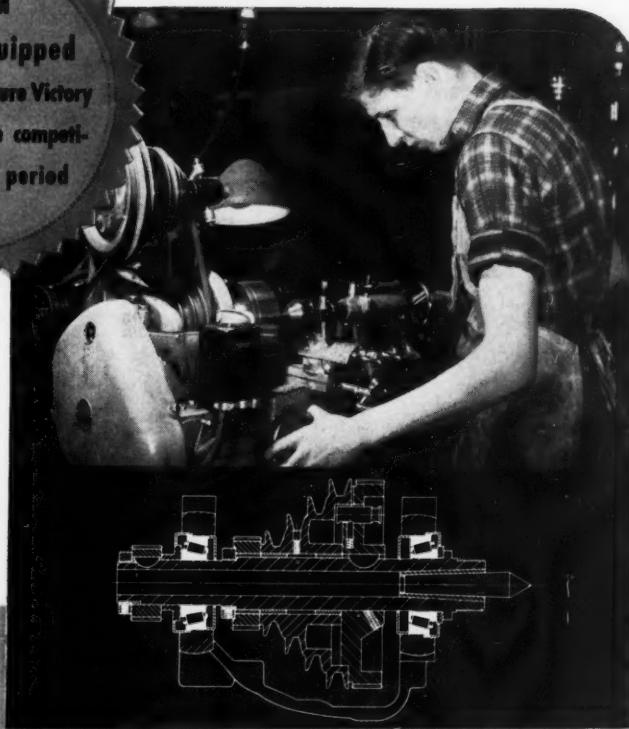
LOGANSPORT, INDIANA

Timken

Bearing Equipped
machine tools assure Victory
now—and in the competitive
post-war period
ahead.

Photograph courtesy
Atlas Press
Company, Kalamazoo, Michigan.

Timken Bearing
spindle mounting
as used in Atlas
Lathes.



At no previous time have the speed and accuracy of Timken Bearing Equipped machine tools been so valuable as they are now when ruthless foes confront us and every minute counts.

The Atlas F-Series Lathe shown in the photograph is turning out small precision parts for a famous American fighter plane that already has proved its speed and fire power in many a tough battle.

Timken Bearings hold the spindles of Atlas lathes rigid under all operating conditions; prevent chatter; increase production—just as they do the spindles of an overwhelming majority of all makes of American machine tools—great and small.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

THE TIMKEN ROLLER BEARING
COMPANY, CANTON, OHIO

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Higher Production
for Low Cost
Accuracy



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LOW COST—2400 inch of
thread per
chaser grind.

PRODUCTION—200 eyebolts, $\frac{3}{4}$ " dia.,
16 pitch, 3" thread
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Are you interested in duplicating this performance?

LANDIS MACHINE COMPANY **WAYNESBORO**
PENNSYLVANIA



**What we have offered for years
is more necessary than ever today**



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Only winning the war counts today, therefore, your problems are our problems and our 200 engineers with years of experience and innumerable records are yours for the asking. Let's get them together wherever there is work of precision finishing.



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It's an "all out" co-operation so why not take advantage of our experience and manufacturing facilities.



SERVICE

•Precision Internal
and Surface Grinding
Precision Boring,
Facing or Turning.

The HEALD MACHINE COMPANY, WORCESTER, MASS.



MORE PIECES PER GRIND WITH CIRCULAR RELIEF GRINDING



For grinding reamers, taps, cutters and all tools that require clearance along their periphery. The Circular Relief Grinder has been perfected to such a high degree of precision that it effects economies unapproached by older methods of relief grinding — And this grinder generates the neatest approach yet obtained to the ideal cutting edge for all tools within its range. We have always given reasonable delivery.

You Get . . .

- More grinds during life of tool
- Closer tolerance
- Exact duplication of grind
- Simplicity of operation
- Smaller investment in tools
- Greater profit



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Complete
Information**

ONE MACHINE • ONE SET-UP • ONE OPERATION

THE CLEVELAND TOOL ENGINEERING CO.
9205 DETROIT AVE. • CLEVELAND, OHIO

"GREEN AS GRASS . . .
BUT HE DOES GOOD WORK
WITH PHILLIPS SCREWS"



"AND DON'T FORGET!
PHILLIPS SCREWS
COST LESS TO USE"



Easy Driving • Elimination of Accidents • Better Work = 50% Less Assembly Cost with Phillips Screws

Assembly jobs that demand extra patience and plenty of time when using slotted screws, can now be handled . . . in a rush . . . by green men . . . who work with Phillips Screws.

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are practical. Electric and pneumatic power drivers on many jobs where their use had previously been restricted.

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Altogether, you can depend on twice the assembly production with Phillips Screws! Remember that for today's conditions when you're interested in saving time. Remember it for tomorrow's conditions when you may be more interested in saving cost!

Any of the firms listed below can supply further information.



PHILLIPS RECESSED HEAD SCREWS

GIVE YOU *2 for 1* (SPEED AT LOWER COST)

WOOD SCREWS • MACHINE SCREWS • SHEET METAL SCREWS • STOVE BOLTS • SPECIAL THREAD-CUTTING SCREWS • SCREWS WITH LOCK WASHERS
U. S. Patents on Product and Methods Nos. 2,046,343; 2,046,837; 2,046,839; 2,046,840; 2,082,085; 2,084,078; 2,084,079; 2,090,338.
Other Domestic and Foreign Patents Allowed and Pending.

American Screw Co., Providence, R. I.
Baldwin Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.

International Screw Co., Detroit, Mich.
The Jamison & Sessions Co., Cleveland, Ohio
The Johnson & Miller Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
The Charles Parker Co., Meriden, Conn.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.

Phenix Manufacturing Co., Chicago, Ill.
Russell-Bendall & West Bolt & Nut Co., Port Chester, N. Y.
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Shakespear Inc., Chicago, Ill.
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Spring tempered COLLETS



Order From Stock

Scientifically heat treated to a true spring temper, "Rivett Mark" collets resist wear and hold their spring longer than collets of any other make. As standard equipment on all makes of lathes and millers, (see Rivett Bulletin 100B) they may be ordered for immediate delivery from the following stocks:

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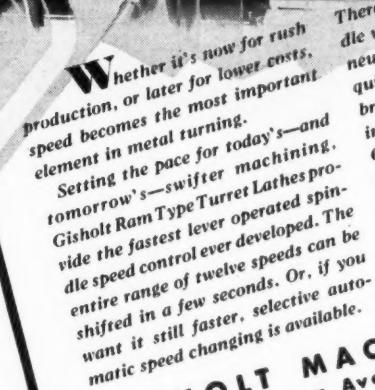
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BOSTON

Rivett Lathe & Grinder Inc.
18 Riverview Road, Brighton

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BRIGHTON, BOSTON, MASS.

IT WILL TAKE SPEED-



There's no lag with a coasting spin-neutal. The machine is shifted to quickly by an automatic stopped brake. And you waste no time bringing tools into cutting position with Gisholt's automatic indexing and clamping of the hexagon turret. The operator can complete the cycle without taking his hand from the pilot wheel.

Minutes are vital! To win in war or
peace, it will take speed.

the fastest
speed control ever devised.
Entire range of twelve speeds can be
shifted in a few seconds. Or, if you
want it still faster, selective, automatic
speed changing is available.
Minutes are valuable.
Peace, it will take speed.

GISHOLT MACHINE COMPANY
1219 Washington Avenue, Madison, Wisconsin

Gisholt Runabout. It provides the fastest lever-controlled speed control ever developed. An entire range of twelve speeds can be shifted in a few seconds. Or, if you want it still faster, selective automatic speed changing is available.

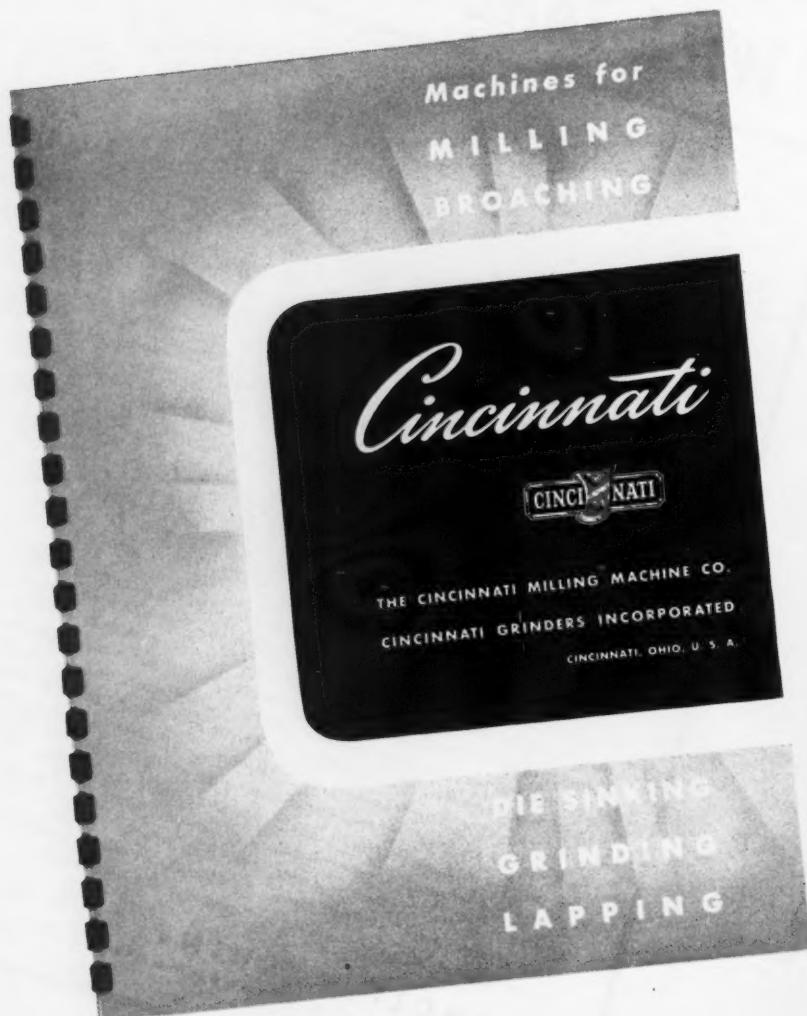
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1219 Washington Avenue, Madison, Wisconsin

the pilot who
Minutes are vital! For
peace, it will take speed.

LOOK AHEAD . . . KEEP AHEAD . . . WITH GISHOLT IMPROVEMENTS IN METAL TURNING

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

To Help You Quickly Choose The



- Catalog M-995. Shop men interested in milling, surface broaching, die sinking, cylindrical grinding, or centerless lapping may obtain a copy of this publication.

THE CINCINNATI MILLING MACHINE CO.

TOOL ROOM AND MANUFACTURING MILLING MACHINES . . . SURFACE BROACHING MACHINES . . . CUTTER SHARPENING MACHINES

Use The Right Type of Machine Tool

FOR MILLING . . . BROACHING . . . DIE SINKING GRINDING . . . LAPPING

THE choice of a machine tool starts with knowing what kind of work can be done on the machine. This basic information is given in an attractive 44-page spiral bound catalog, covering all types of machines bearing the CINCINNATI trade-mark. It also gives you sufficient data on machine features and specifications to definitely fix the size and type of machine for your product.

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- FILMATIC SPINDLE BEARINGS . . . with all the FILMATIC advantages and assurance of sure quality. (See page 29.)
- PRESSURE LUBRICATED TABLE AND CROSS WAYS . . . with more maintain new machine accuracy for years.
- INFINITE NUMBER OF TABLE TRAVEL RATES . . . from 3 to 22 inches per minute . . . a sufficient range for fine wheel grinding.
- UNIT CONSTRUCTION . . . each control group assembled for easy removal.
- CENTRALIZED CONTROLS . . . simplified, easy to operate . . . located at operator's normal working position. Electric control buttons are grouped.
- EXCEPTIONALLY ACCURATE TABLE REVERSAL . . . can confidently grind close to shoulders.
- EXTRA PRODUCTION FEATURES . . . may be selected to do many

OTHER IMPORTANT FEATURES

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Handwheel speeds are infinitely variable, controlled

with a rheostat in front of the machine, gears, worms, or chains in the head motion, resulting in extremely smooth

The arm feed may be arranged in any way, conforming to production requirements.

1. Hand mechanical.
2. Combined with Servo hydraulic.
3. Full automatic hydraul.

CINCINNATI GRINDERS INCORPORATED

CINCINNATI,
OHIO U.S.A.

ENING MACHINES . . . CENTERTYPE GRINDING MACHINES . . . CENTERLESS GRINDING MACHINES . . . CENTERLESS LAPING MACHINES



KNIGHT SHIFT

Shift those milling jobs to a balanced KNIGHT MILLER. You'll get: greater speed in turning out higher quality work; quick and accurate machining of difficult parts without special equipment; easy and convenient adjustments that save time.

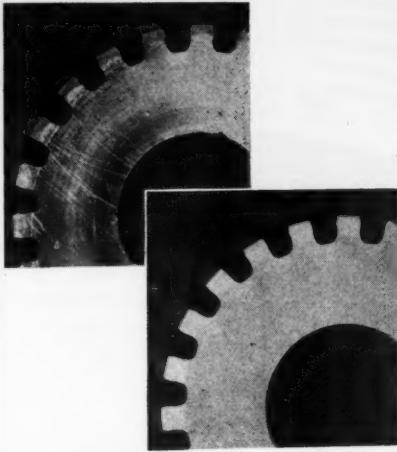
The versatility, accuracy, speed and power, balanced equally in the KNIGHT MILLER, make it the machine for your milling needs.

Knight-Time is Production-Time.

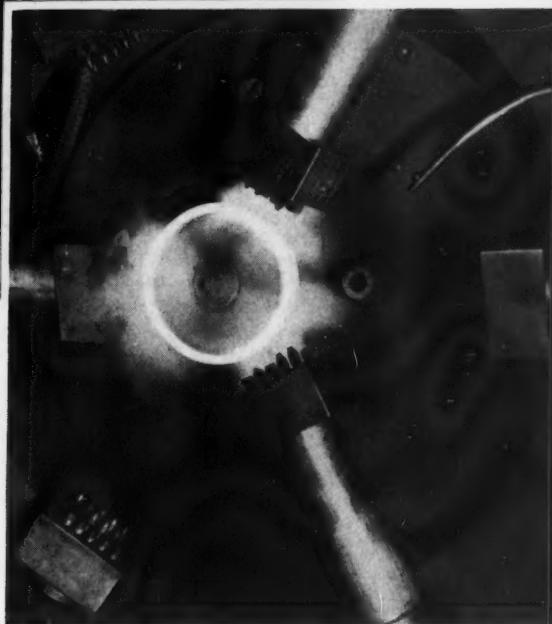
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*W. B. Knight Machinery Co.
ST. LOUIS, MISSOURI*

Flame Hardening FOR CONTROLLED PENETRATION



- A helical pinion before and after sandblasting to disclose penetration which stops at the root of the teeth. Gas consumption per 50 gears, 35 cu. ft. each of oxygen and acetylene.



The Fellows Flame Hardener is a speedy method for heating work for hardening. As an instance, the complete set-up of machine for the 2.3" P.D. helical pinion shown at the left took 25 min. It takes just 5 seconds to heat a gear, and 12 minutes for a production run of 50. Distortion is at an absolute minimum. . . . For machine and operating routine details write for our 12-page color-illustrated bulletin.

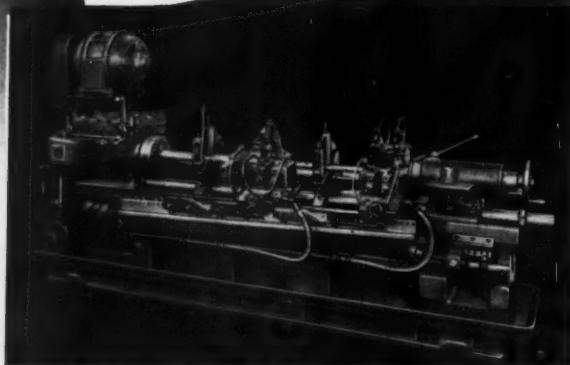
THE **FELLOWS** GEAR SHAPER COMPANY

78 Park St., Springfield, Vermont—640 West Town Office Building, Chicago, Illinois—616 Fisher Building, Detroit, Mich.

JAMES NASMYTH



IN 1851 at the Crystal Palace, London, the Duke of Wellington, James Nasmyth and Joseph Whitworth saw six American rifles taken apart, saw the parts shuffled and six rifles quickly assembled from parts chosen at random. Thus was interchangeable manufacturing introduced to England from a Vermont shop, of which the Jones & Lamson Machine Company is a direct successor. Thus also did this Vermont machine tool shop win the contract for equipping Britain's Enfield Armory—an early and bright chapter in Anglo-American cooperation.



Jones & Lamson 12 x 81" Fay Automatic Lathe tooled to machine an aircraft cannon

AUTOMATIC THREAD GRINDERS



OPTICAL COMPARATORS



RAM TYPE UNIVERSAL TURRET LATHE



knew a good thing

when he saw it.

NINETY years have passed since James Nasmyth, famous British engineer, arranged for a Vermont machine tool shop to equip the Enfield Armory for interchangeable manufacturing.

Today all the democracies need weapons and need them desperately, and the same Vermont machine tool builders are gladly playing their part in the nation-wide effort to arm ourselves and our allies.

The original shop has long since disappeared. The name of the firm has changed more than once. Three generations of eager, active, highly trained men have followed each other to eternal peace, each leaving behind an improved,

advanced, more precise, more rapid machine tool technique.

That technique survives, but not even that survives unchanged, for the present generation of Jones & Lamson engineers is continuing to advance, refine and speed it up — with the same spirit and thoroughness displayed by its predecessors.

Herein lie many of the reasons why it pays to put your production problems up to Jones & Lamson engineers. Let Jones & Lamson help you. Inquiries from large plants or small receive careful, thorough study, and illustrated catalogs of Jones & Lamson equipment are available.

JONES & LAMSON MACHINE COMPANY • Springfield, Vermont. U. S. A.

*Manufacturers of Ram & Saddle Type
Universal Turret Lathes . . . Fay Automatic
Lathes . . . Automatic Thread
Grinding Machines . . . Comparators
... Automatic Opening Threading
Dies and Chasers*



PROFIT PRODUCING
MACHINE TOOLS

FAY AUTOMATIC LATHES

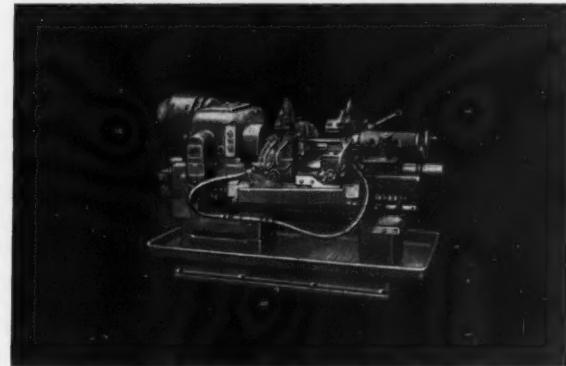


AUTOMATIC OPENING
DIE HEADS

SADDLE TYPE
UNIVERSAL TURRET LATHE

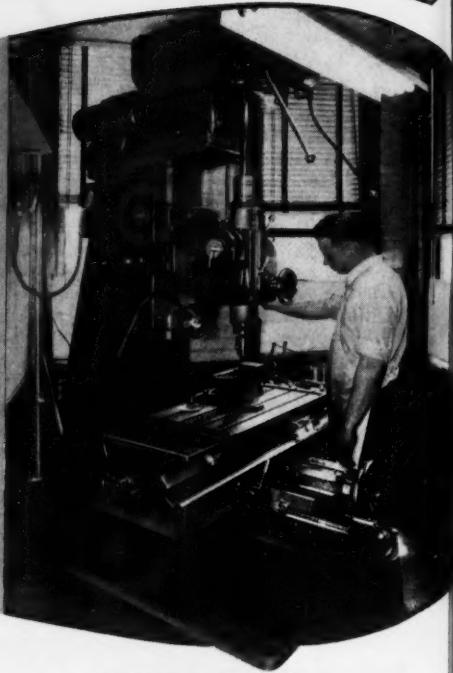


*Jones & Lamson 8 x 33" Fay Automatic Lathe
tooled to machine an automatic rifle barrel*



FOSDICK

JIG BORER *in support of* **NATIONAL DEFENSE** ★



With the pressure on for all out production the need for an all around utility machine like this Fosdick Jig Borer is most urgent. Speed, accuracy and universality are fundamentals of design and construction of this popular machine. Simplicity of operation and adaptability to both tool room and production work make it indispensa-

**FOSDICK Jig Borer at
Atlas Tool & Machine Co.**

ble to innumerable jobs for defense production.

For a moderately priced machine not requiring highly skilled labor you should investigate the economy of the Fosdick Jig Borer—its use is practically universal.

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FOSDICK MACHINE TOOL COMPANY
CINCINNATI . . . OHIO



Van Norman
**HAND
MILL**

...adds new utility to any Production Department

This modern machine is an invaluable "general utility" member of the milling lineup in any production department... bringing new speed, accuracy and economy to the output of many small and medium-sized parts.

The Hand Mill is built to the highest standards of precision, with plenty of rigidity and power for maximum metal-removing capacity, and smooth operation. The heavy-duty cutter-spindle, mounted in the movable cutter-head, is driven by a 1 1/2 HP motor. This machine has the rugged strength for heavy cuts... and at the same time, has the sensitivity for smaller, lighter cuts. Every feature of the Van Norman Hand Mill is designed to assure the same high standards of performance which have been the distinguishing mark of all Van Norman Milling Machines for more than half a century. Write for bulletin.

SPECIFICATIONS:

Table: 26" x 6"
Table Longitudinal Adjustment: 17 1/2"
Table Cross Adjustment: 7 1/2"
Table Vertical Adjustment: 12 1/2"
Cutterhead Vertical Movement: 6"
Spindle Speeds: 160 to 1100 rpm
1 1/2 HP Motor Drive

VAN NORMAN MACHINE TOOL COMPANY • SPRINGFIELD, MASSACHUSETTS

APEX

BITS and DRIVERS for

Phillips Screws
Slotted Screws
Clutch Head Screws

Give the little gals a hand!

Take a look around almost any assembly department and you'll find young women doing much of the lighter work. You may have some in your plant operating power drivers or using hand screw drivers.

Give her a chance . . . give her a hand . . . give her the right tools . . . and she'll up your production. Give her APEX Power Bits for Phillips, or Clutch Head or Slotted Head screws. They'll help her

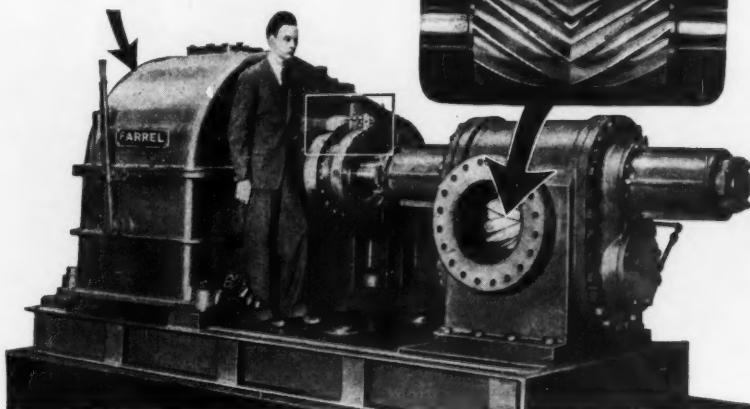
- drive more screws before changing Bits
- drive more screws per day
- lower costs per thousand screws driven.

APEX Power Bits and Hand Drivers are used by almost all aircraft production plants and many of the Defense plants.

Write for Catalogs

The APEX MACHINE & TOOL Co.
Dayton, Ohio

FARREL ROTORS and GEAR DRIVE



Move Liquids Fast in Worthington Pumps

This photograph illustrates the extremely wide range of sizes of Worthington Rotary Pumps which use Farrel-Sykes continuous tooth herringbone gears for the rotors.

The smaller pump is designed to deliver 6.5 GPM and is driven by a $\frac{3}{4}$ HP motor at 1750 RPM. The larger pump, driven by a 350 HP motor, operates at 71 or 142 RPM, and at the higher speed has a capacity of 2450 GPM.

For any size pump Farrel-Sykes herringbone gear rotors are more efficient and are suitable for higher speeds and higher pressures than spur tooth rotors. They are precision generated on Farrel-Sykes Gear Generators with a special tooth shape. There is no end thrust and no trapping of the liquid. They give high

volumetric efficiency and uniform flow without appreciable pulsation. When properly fitted in the pump housing they run smoothly and silently at high speeds.

Farrel gear units of the type driving the large pump also provide smooth, quiet, uniform transmission of power and give unfailing efficient performance under the most exacting operating conditions. A complete series of these self-contained and totally enclosed gear units is available for a wide range of industrial applications. They are standardized in general design with variations of detail to suit specific conditions of speed, load and service.

Manufacturers of pumps and users of gear drives are invited to send for catalogs and engineering data giving detailed information.



FARREL - BIRMINGHAM COMPANY, Inc.
381 VULCAN ST. - - - - - BUFFALO, N. Y.

The Gear with a Backbone

WICACO CONTINUOUS OIL GROOVER WICACO INTERNAL GRINDER

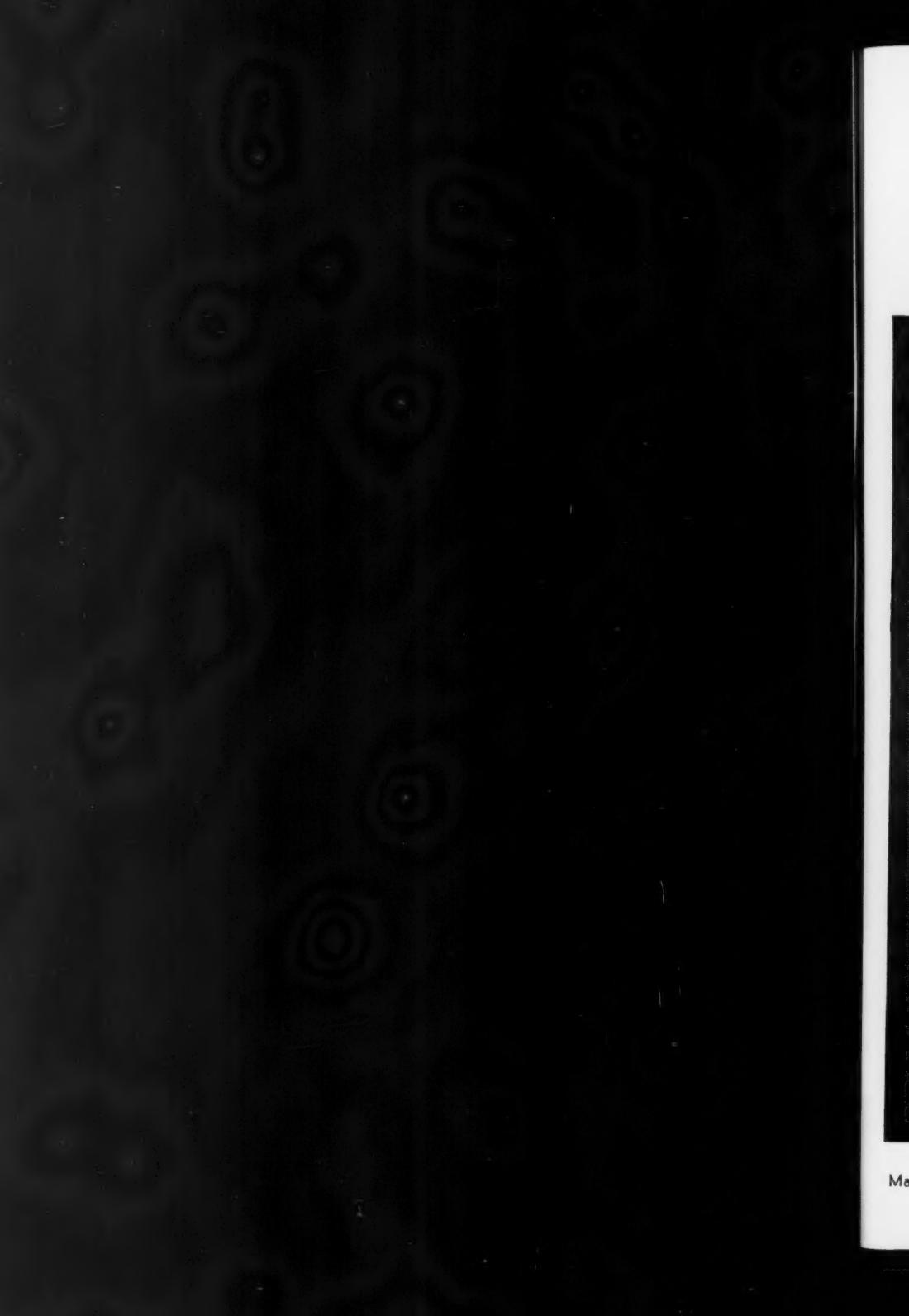


THE WICACO CONTINUOUS OIL GROOVER—Unequalled for production of all types of oil grooving, straight and spiral. 500 or more pieces per hour, economical on short runs, operated by unskilled labor. Loading and unloading without stopping the machine.

For many years this—**THE WICACO PRECISION INTERNAL GRINDER** machine has maintained its reputation for extreme accuracy and economical production. It has proved invaluable to aircraft, automotive and diesel manufacturers and is a toolroom necessity. Many exclusive features. Model illustrated is equipped with motor generator (extra cost) to provide DC operation.

Good deliveries possible. Write for details.





JARVIS

POWER TOOLS



Jarvis Tappers are available in a complete range of sizes up to 2" capacity. Friction as well as positive types according to your requirements.

**THE CHARLES L. JARVIS
COMPANY**
MIDDLETOWN, CONN.

THOMPSON FEATURES

POINT THE WAY TO MODERN,
LOW-COST PRECISION GRINDING



TYPE C
24" x 16" x 48"

CHECK THIS LIST OF FEATURES AGAINST ANY OTHER GRINDER!

- Automatic Down Feed
- Hydraulic Rapid Traverse (Pat'd.)
- Automatic Wheel Truing
- Power Elevation
- Rectangular Column Ways
- Telescope Piping
- Instant Central Controls
- Anti-Friction Elevating Nut
- Massive Machine Beds
- Hydraulic Power Unit
- Wheel Head Slide Wipers
- Automatic Spark-out Control

ALSO SPECIAL ATTACHMENTS

For instance—
**2. HYDRAULIC
RAPID TRAVERSE**

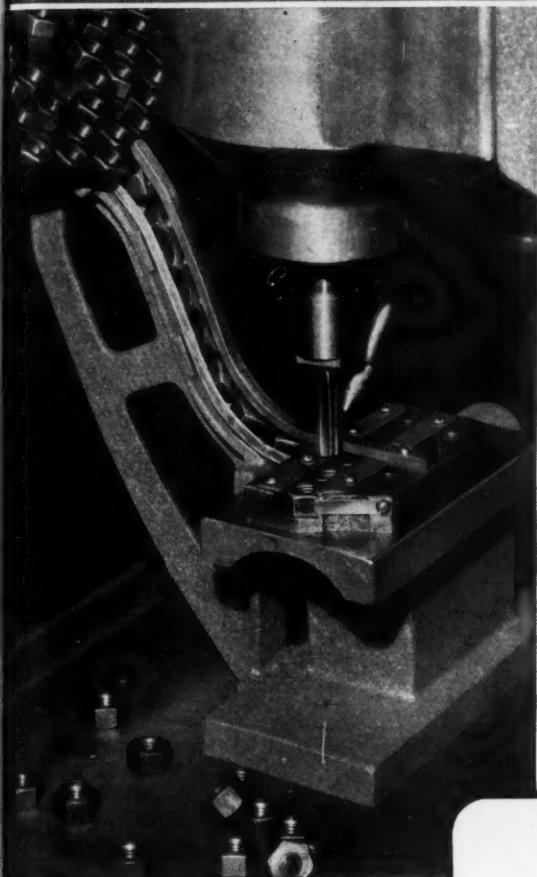
...SAVES OPERATOR'S
TIME MOVING THE
WHEEL HEAD TO AND
FROM THE WORK

Several features assure economy, precision, and increase production in every Thompson Hydraulic Surface Grinder. The hydraulic rapid traverse, as mentioned above, is operated by the cross feed lever and assists the operator in increasing his hourly output. As a time- and labor-saving device, it is a real feature on any grinder but standard on the complete Thompson line. Full specifications sent to you free upon request. Write today for the latest bulletin.

THE THOMPSON GRINDER CO.

Completely Covering all Normal Ranges of Surface Grinding Requirements
SPRINGFIELD, OHIO, U. S. A.

FOR THE DURATION... AND THE YEARS BEYOND!



• Haskins designed standard nut fixture with an air operated plunger positions these $\frac{1}{8}$ " hex nuts and ejects them after tapping. Operator has only to place the blanks in the hopper. Class 3 fit.

European Representative—G. E. Marbaix, Ltd.
Humgla House, London, S.W.1.

NEW BOOKLET—“Holding Fixtures for Haskins Tapping Machines”—contains many new ideas. Send for a copy.

WHEN Victory is won—when wartime emergency needs have passed—Haskins Tappers will continue to pay big dividends in lower tapping costs per man and machine hour.

A simple adjustment or two—perhaps an inexpensive fixture change—and these standard machines can be quickly set up for the normal needs of private industry.

Much more than a temporary speed-up measure, Haskins Tappers are a profitable, long-term investment in production efficiency! R. G. Haskins Company, 620 S. California Ave., Chicago.



HASKINS
Precision
**TAPPING
EQUIPMENT**

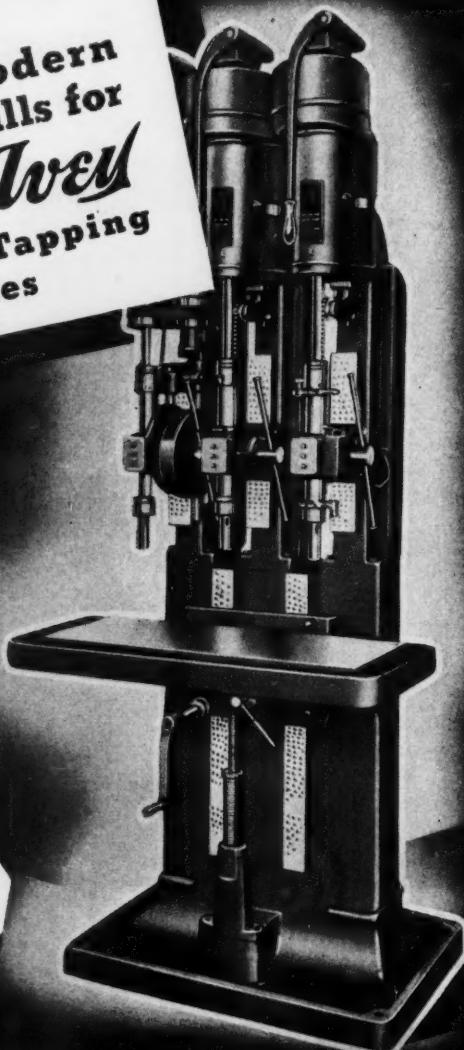


Why Modern Production Calls for Motor-Avey Drilling and Tapping Machines

7 GOOD REASONS

- Precision built for precision work
- Highest quality in materials and workmanship for dependable, continuous, long life service
- Modern in every detail of design, capacity and construction
- Various types . . . 6 or 8 spindle speeds . . . for ordinary or high speeds
- Two speed motor with three mechanical changes
- Push button control . . . low, stop and high
- Fast workers in any material . . . thus speeding up production and assuring maximum returns on the capital investment

Write for Illustrated Literature



THE AVEY DRILLING MACHINE COMPANY
CINCINNATI, OHIO

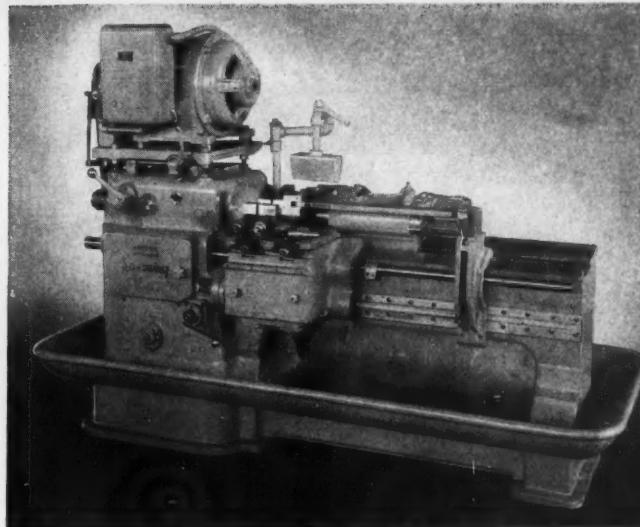
Lo-swing MODEL LR LATHE

**For Economy
and Consistent
Accuracy on
Volume Production
or on Short and
Medium Runs**

Model "LR" is a fully automatic, cam-operated lathe, incorporating the time-tested Lo-swing principle of sufficient mass and rigid tool support. Its field includes practically any work within its capacity — 2" diam.

for normal stock removal, 4" diam. for light cuts, 5" diam. for flanged work — and up to 46" between centers in the longest bed length. This machine, while offering the utmost in flexibility, is 100% mechanical without any clutches in the feed train. Not only is the "LR" a very simple machine to service, but once set it cannot get out of time. All rotating shafts are anti-friction bearing equipped. Lubrication is adequate and automatic. Carriage ways are of hardened steel to provide greater wear resisting qualities.

Ease of set-up and operation are provided by the built-in Seneca Falls CHANGE-OVER MECHANISM by which length of carriage stroke may be quickly varied; CONVENIENT LEVERS for throwing in and out the feed and



rapid traverse (normally automatic) manually, and by the LOW CENTER HEIGHT (37") which allows the operator to examine and adjust all tools from the operating position. Low center height also contributes to ease of loading.

Model "LR" Lo-swing is designed to provide maximum efficiency with carbide tools. It is a versatile lathe in that it may be equipped with either direct V belt drive to the spindle for high speed, fine finishing cuts, or a geared drive with pickoff gears for slower roughing cuts. The Model "LR" Lo-swing may also be equipped with a Third Slide (overhead) as well as additional back-squaring attachments, carriages and carriage slides, making for innumerable tooling possibilities.

SENECA FALLS *Automatic* WORK DRIVER



Self Centering... Quick Acting... No Slip. Attaches to any chuck plate or spindle. Provides a positive, balanced drive which reduces chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO.

SENECA
FALLS, N.Y.

Solved! Your Turret Lathe Problem

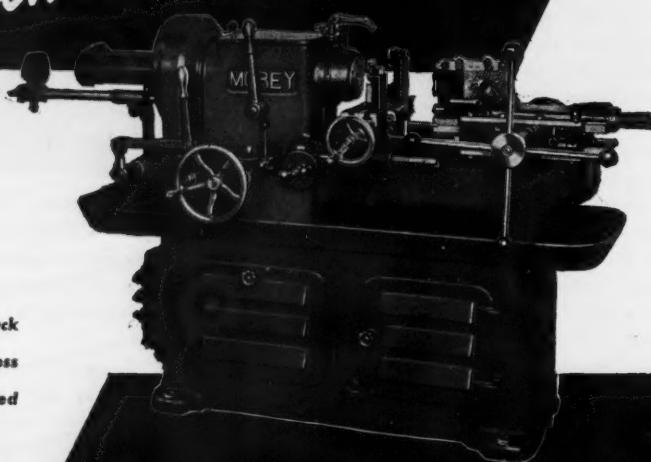
The MOREY 2G

1 COLLET CAPACITY

TURRET LATHE

Timken Bearing—Self-Locking Turret—Infinite Spindle Speeds

Quick Delivery



CAPACITY
Automatic Chuck
(round) 1"
Swing over cross
slide 6"
Swing over bed
14"

Full description
and detailed il-
lustrations are
shown in Bulletin
629. Ask for it
TODAY!

Join the parade of high speed defense producers
with the MOREY 2G Timken Bearing Turret Lathe,
with Self-Locking Turret. You are assured vibrationless
precision with an infinite variety of spindle speeds for
every job. It's designed to take full advantage of high speed
and carbide tools. Back gears are instantly thrown in through
extra large Twin Disc Clutch. Can be furnished with Tooling!

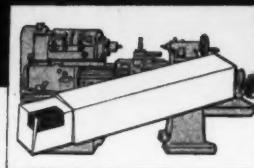
MOREY MACHINERY CO., INC

410 BROOME STREET • NEW YORK, N. Y.



WHICH CAME FIRST?

CUTTING TOOL?



MACHINE TOOL?

The answer is easy when applied to the cutting tool vs. the machine tool.

The Cutting Tool always comes *first*—of necessity! Major advances in cutting tools lead to new designs of machine tools.

On new cutting jobs, the selection of the machine tools depends on the kind of Cutting Material to be used.

For example, you must first make a choice between high-speed steel, super high-speed steel, and a sintered carbide like Firthite. We are makers of all these cutting materials:

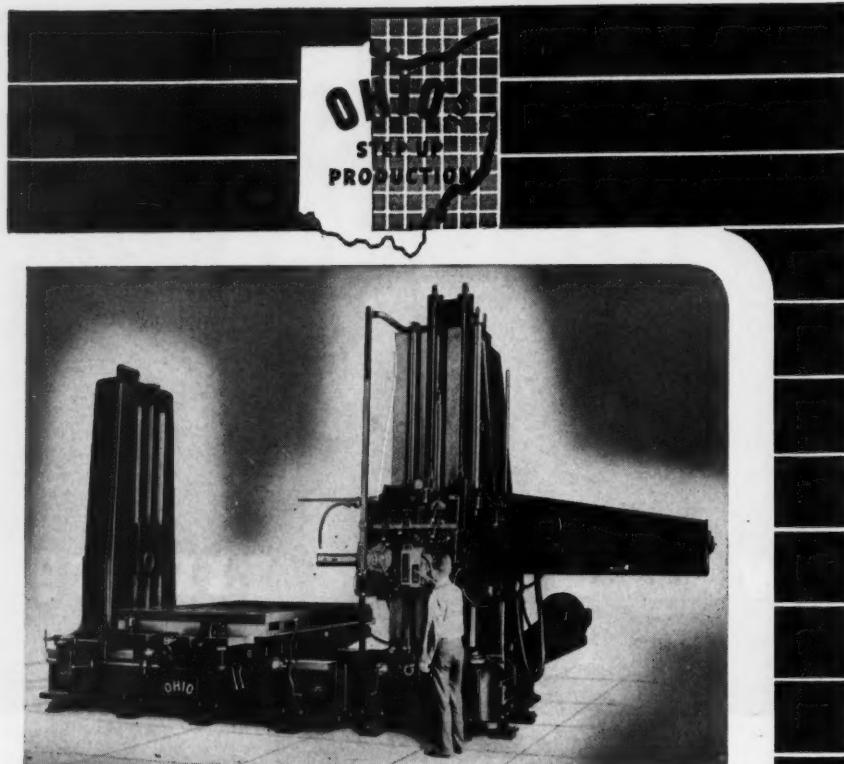
STAR-MO, "Moly" High Speed Steel • CIRCLE C Super High Speed Steel

BLUE CHIP 18-4-1 High Speed Steel • FIRTHITE Sintered Carbide

Our engineers will be glad to help you find the best type for every job.

FIRTH-STERLING STEEL COMPANY

OFFICE AND WORKS
McKEEPORT, PA.
BRANCH WAREHOUSES:
NEW YORK CHICAGO
HARTFORD PHILADELPHIA
LOS ANGELES CLEVELAND DAYTON
DETROIT



Output has no meaning apart from excellence of product. Features built into Ohio Horizontal Boring, Drilling and Milling Machines now stand in good stead as Defense demands increases in both quantity and quality. Examples: nitrided spindle, narrow guides, internal gear-tooth type clutches, unit construction, push-button control, anti-friction bearings, built-in rapid traverse to spindle and all other parts, continuous spindle feed of 72" with full-length spindle support. Table type extra heavy duty model shown. Also floor type in extra heavy duty model; table and floor types in heavy duty model. Get Bulletin 300 or 310.

THE OHIO MACHINE TOOL COMPANY, KENTON, OHIO

OHIO DREADNAUGHT

BORING MACHINES • SHAPERS • PLANERS

WHEELS OF FORTUNE



CHICAGO MOUNTED WHEELS

Round and round they go—millions of them—doing every conceivable kind of grinding and polishing job in machine, pattern and die shops, tool rooms, defense plants, foundries, etc.

Designed for rapid, smoother work wherever high-speed, portable grinders are used—these superior wheels of V/T Super Bond give 150% to 300% longer service, according to actual tests.

Chicago Mounted Wheels come in a wide variety of shapes, grains, grades and sizes.

TRY ONE FREE

If you've never used Chicago Mounted Wheels, you might like to try a working sample. Write us the style grinder you use and size wheel desired. You'll be amazed at its performance, stamina and the way it holds its shape.

CHICAGO WHEEL & MFG. CO.

Quality Grinders and Wheels for 40 Years

1101 W. MONROE ST. DEPT. MM. CHICAGO, ILL.
©C.W. & M.CO. 1941

NEW CATALOG

Just off the press—the most comprehensive mounted wheel catalog ever published. Shows the complete line of Chicago Mounted Wheels with detailed instructions for their use.

Send for copy today.

Wider Necks for production bottles...

When the smooth flow from modern automatic machinery must pass through hand assembly, production miracles cease . . . and speed rests on the individual skill of men . . . and on the *fitness for the job* of every tool they work with. In countless thousands of assembly operations throughout America's vital war industries, Snap-on tools are a definite part of the picture . . . their superior speed, precision and adaptability, a measurable and important factor in eliminating waste effort and speeding up assembly. 3000 Snap-on hand and power tools are everywhere available through 35 factory branches, 550 trained representatives.



No. 477-Y SET —
Every possible handle
hook-up from midget
sliding bar to heavy
duty 6" head ratchet.
28 Double Hexagon
screws from $\frac{1}{4}$ " to
 $1\frac{1}{2}$ ".

SNAP-ON TOOLS CORPORATION
8032-C 28th Avenue
Kenosha, Wisconsin



***Snap-on
Tools***



He'll even miss his dinner *for you*

CALL YOUR UNION DRAWN DISTRIBUTOR FIRST

Day or night, he's ready to help you keep production rolling. For your Union Drawn Distributor is going full out these days.

Due to *Production for Victory*, he may not be able to deliver all the steel bars and shafting you want when you need them. But he hasn't been caught "holding the bag." He has broadened his service and tuned it to the times. While it has made his job harder, it has also made his service more valuable.

He's working long hours studying customer needs and analyzing available steel bar stocks to find the solutions.

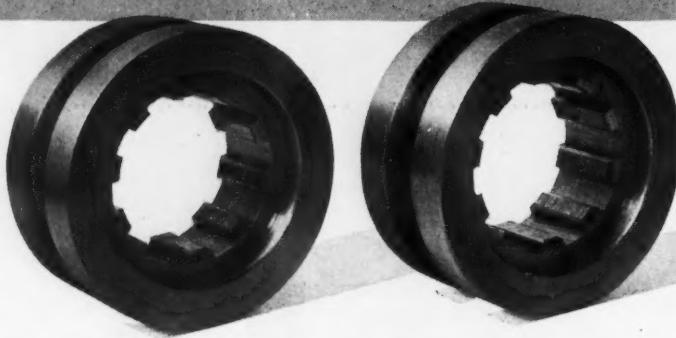
He's usually able to deliver quickly a few bars for small jobs, or enough to get big jobs tooled up and ready to roll when mill shipments arrive. If he doesn't have them in stock, he makes every effort to get them. He often finds other grades that can be used. His knowledge of steels and their fabrication has helped to conserve steel supplies, increase unit production.

You've nothing to lose and a lot to gain by calling your Union Drawn Distributor *first*. Start today. Union Drawn Steel Division, Republic Steel Corporation, Massillon, Ohio.



Republic
UNION COLD FINISHED STEELS

USE *Ingenuity* TO GET



Illustrated above is a heavy double jawed clutch, before and after being finished on a Monarch lathe, prior to cutting jaws and heat-treating. The operation consists of turning outside diameter, forming groove, straddle facing sides, necking groove diameter and chamfering 4 outside corners.

This job is representative of the thousands of simple parts being machined in large and small lots, where ingenuity in planning will save time and release men and machines for other work. In this plant, it is being done with a single setup on a Monarch 18" Model BB lathe, with double connected rest, tool block in front, and multiple tool block in rear.



How this job is done

- 1 Press piece on spline arbor and place between centers in lathe.
- 2 Turn diameter, using tool held in rear tool rest.
- 3 Form groove, allowing for grind. This tool is held in the rear rest.
- 4 Straddle face sides, and chamfer, tools being held in front tool rest.
- 5 Neck diameter and sides of groove for grind relief.
- 6 Remove from machine and press off arbor.

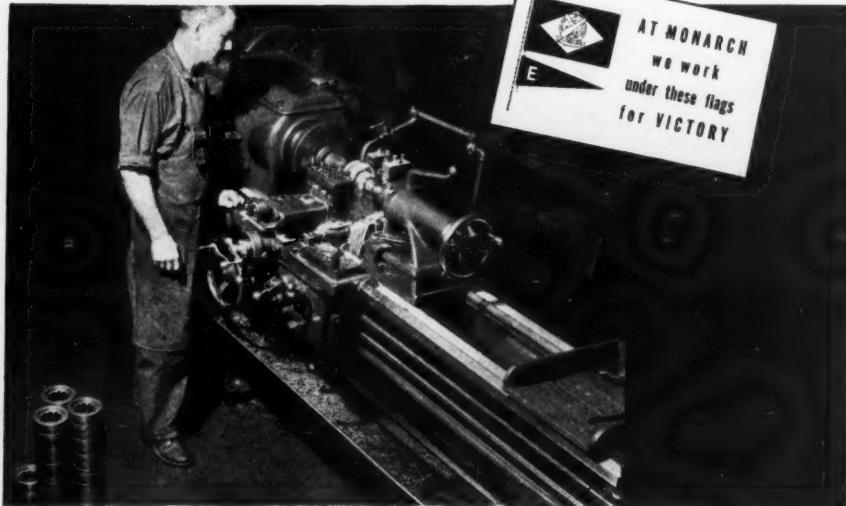
Material — SAE-2350 steel. Tools — cemented carbide. Total time — 8 minutes.

MORE WORK FROM MACHINE TOOLS

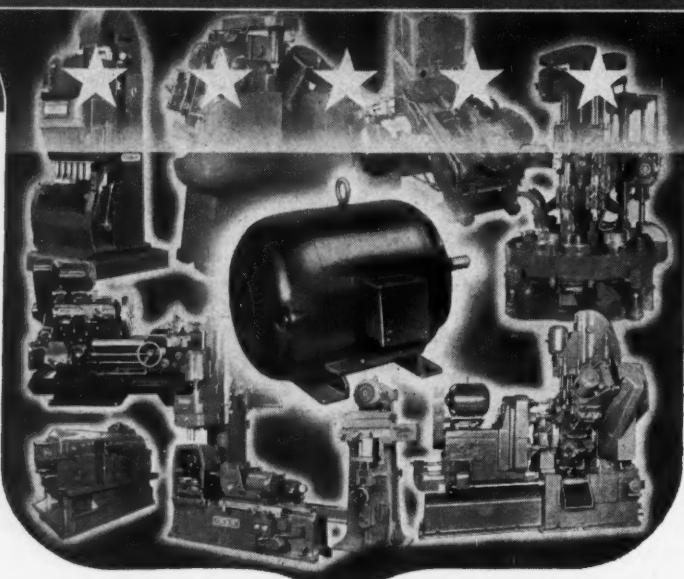
By using this method, one lathe and operator do the work with a single setup, instead of three separate setups, thus permitting more production from a single lathe.

This illustrates the ability of Monarch lathes to do a wide variety of work, valuable under our present production program. Their design and construction assure accurate performance, high productivity and long life. This is why Monarch lathes carry today's loads without faltering or lost time for maintenance and repairs. **THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO.**

MONARCH  **LATHES**
COVER THE TURNING FIELD



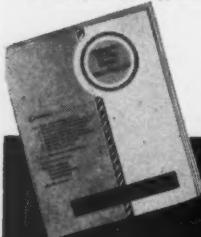
Keep War Production Schedules on Time



Use

**SEND FOR THIS
FREE BULLETIN**

Bulletin MU-182 on Wagner Polyphase Motors contains complete technical data and information that every user of machine tools should have. Write for your FREE copy today.



WAGNER MOTORS

On Your Machine Tools

The high efficiency and dependability of Wagner totally-enclosed fan-cooled motors make them the choice of users of all types of machine tools. They reduce maintenance costs by giving longer service under the most severe operating conditions.

Here are a few of the reasons why Wagner CP motors are ideal for all types of machine tools —

1. **TWO FRAMES** — The inner frame prevents the entrance of metal dust, chips or cutting oils. The outer frame guides a strong cooling draft over the motor.
2. **EXACT ELECTRICAL CHARACTERISTICS** — Built in several distinct electrical types with varying torque and current characteristics required by the various types of machine tools.
3. **PRECISION CONSTRUCTION** — Dynamically balanced rotor, and all mechanical parts accurately machined to close tolerances to assure smooth operation.

Cut your motor maintenance and keep production schedules on time by specifying Wagner CP motors.

MC2-2

Wagner Electric Corporation
6400 Plymouth Avenue, Saint Louis, Mo., U.S.A.

MOTORS

TRANSFORMERS

FANS

BRAKES

WHEREVER PRODUCTION DEPENDS ON PUMP RELIABILITY — Specify Brown & Sharpe



ROTARY GEARED PUMPS

Spur Gear
Helical Gear
Bronze
Reversible
For Hydraulic Operation
Motor Driven

CENTRIFUGAL PUMPS

Motor Driven
Several styles for a wide
flexibility of installation

Also No. 8 Vane Pump for lubrication

Use dependable
Brown & Sharpe Pumps

. . . for coolant — pressure —
lubrication — hydraulic operation
of machines — and miscellaneous
combinations.

Tell us your pump needs —

Brown & Sharpe Mfg. Co.
Providence, R. I.
U. S. A.

BROWN & SHARPE



FRONT LINE Only "seasoned troops" can stand up to the nation's front line. At the workheads, where the production rate is determined, rely on tools that have proved their ability to stand up "under fire".

MORSE

THERE IS A
DIFFERENCE

**TWIST DRILL AND
MACHINE COMPANY**
NEW BEDFORD, MASS., U.S.A.

NEW YORK STORE: 130 LAFAYETTE ST. - - - CHICAGO STORE: 370 WEST RANDOLPH ST.

Why this new Tapping Head is more Efficient!



The exclusive advanced design of the new Procurier Tapping Heads assures you accurate tapping at high speeds with automatic protection for taps! Tap is driven by a double-cone, cork-faced friction clutch which automatically regulates tap driving power by pressure applied through the drill press spindle. Operators can quickly detect dull or loaded taps by the "feel" or pressure on the clutch required to drive them, thus avoiding needless tap breakage. With this sensitive Procurier smooth-operating friction clutch, bottom tapping is as simple as through tapping, since the clutch instantly slips should the tap strike bottom or stick due to top loading. Built to stand up under hard service. Many other features. If you want to reduce your tapping costs

SEND FOR BULLETIN

giving full details, description and prices on complete line of Procurier Precision Tapping Heads to meet all needs, the new Tru-Grip Tap Holder—and also the full line of Procurier Universal Tapping Machines, hand, foot or air-operated.

Procurier Safety Chuck Co.
12 S. Clinton St.
Chicago, Illinois

Send me bulletins on: High Speed Tapping Heads
 Tru-Grip Tap Holders Universal Tapping Machines
Name _____
Address _____
City _____ State _____

PROCUNIER

SAFETY CHUCK CO.

12 S. CLINTON ST.
CHICAGO, ILLINOIS



**50 Thor Air Grinders
For Every Type Of Job!**



Thor Small Wheel Grinders



**Thor Radial
Wheel Grinders**



Thor Wire Brushes



Thor Rod Grinders

LOOK AT THE RANGE!

Number of Models	50
Wheel Capacities 1½" to 8" dia.	
Speeds	3000 to 21,000 RPM
Lengths	5½" to 39"
Weights	18 oz. to 24 lbs.

**YOU'LL
waste no time
ON GRINDING...**

**with These Powerful
THOR AIR GRINDERS**

To give you top speed for peak production grinding . . . to give you precisely the type of power, light weight, and extreme stamina that make it possible, THOR Air Grinders have these advanced construction features:

1. THOR "Air Behind the Blades" principle keeps the rotor blades out against the cylinder bushing wall, preventing dead center position and assuring instant starting under all operating conditions.
2. The solid one piece construction of the THOR rotor permits the use of deeper blade slots and wider blades. This greatly boosts the power and the rate of material removal.
3. The THOR Double-Acting Safety Governor acts to save time in two ways: It regulates spindle speed to the level of highest grinding efficiency for the size and type of wheel used. It prevents racing of wheels at dangerously high speeds even in event of mechanical failure of governor parts.

You will find these top speed construction features, plus others like THOR End Exhaust, Automatic Lubrication, and Labyrinth Seal on Spindle, in a complete line of THOR Air Grinders for every industrial application. For details, write for THOR Pneumatic Catalog No. 52A.



Portable Pneumatic and Electric Tools

INDEPENDENT PNEUMATIC TOOL COMPANY



600 W. JACKSON BOULEVARD, CHICAGO, ILL.

Branches in Principal Cities

HERE'S A NAME YOU'LL
REMEMBER FROM NOW ON

VARD

MAKERS OF PRECISION TESTING
GAGES • COMPARATORS • TAPS •
AND PRODUCTION MACHINERY

This is our first ad in this magazine.

Our products and name may be unknown to some of you in the East.

But VARD is a good and well-known name on the West Coast especially in the Aircraft industry where we have been filling a large part of the need for extreme precision checking gages.

We show you here two small VARD gages, each ground with the utmost precision from Timken high-graphite tool steel. The threaded plug gage with Go and No Go threads we build in standard sizes and Standard American and Metric pitches.

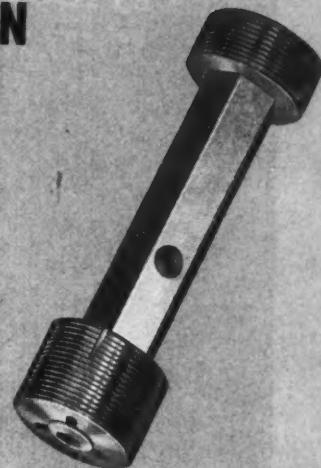
The plain tapered ring gage, or step gage, for checking pipe threads is also produced in all generally used sizes.

We have been making delivery to priority holders in very reasonable time.

VARD IS LOCATED IN PASADENA
A TECHNICAL CENTER OF THE WEST

VARD INC.

SUCCESSOR TO VARD MECHANICAL LABORATORY



VARD THREADED PLUG GAGE
PRECISION GROUNDED FROM
THE FINEST STEEL



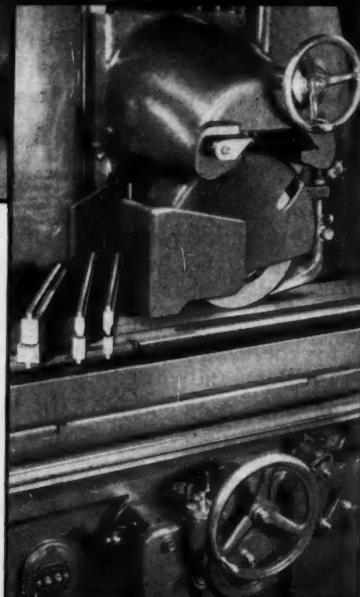
VARD PLAIN TAPERED RING
GAGE—FOR CHECKING
ANPT THREADS

MATTISON GRINDER SPEEDS UP PRODUCTION AT VERSON . . .



PRESS brake dies are being precision ground at high speed on the 30" x 168" Mattison Surface Grinder shown in the photographs. This machine is installed at the Verson All-steel Press Company where exacting manufacturing specifications demand excellent finishes within close limits of accuracy. The steel bars are ground lengthwise on four sides, cut to length, machined to shape, and finish-ground on sides and top. Substantial savings have been effected at Verson through the substitution of grinding for planing in this application.

Rugged, high powered and versatile, Mattison Surface Grinders are built to do your grinding job better and in less time.



MATTISON MACHINE WORKS - ROCKFORD, ILLINOIS

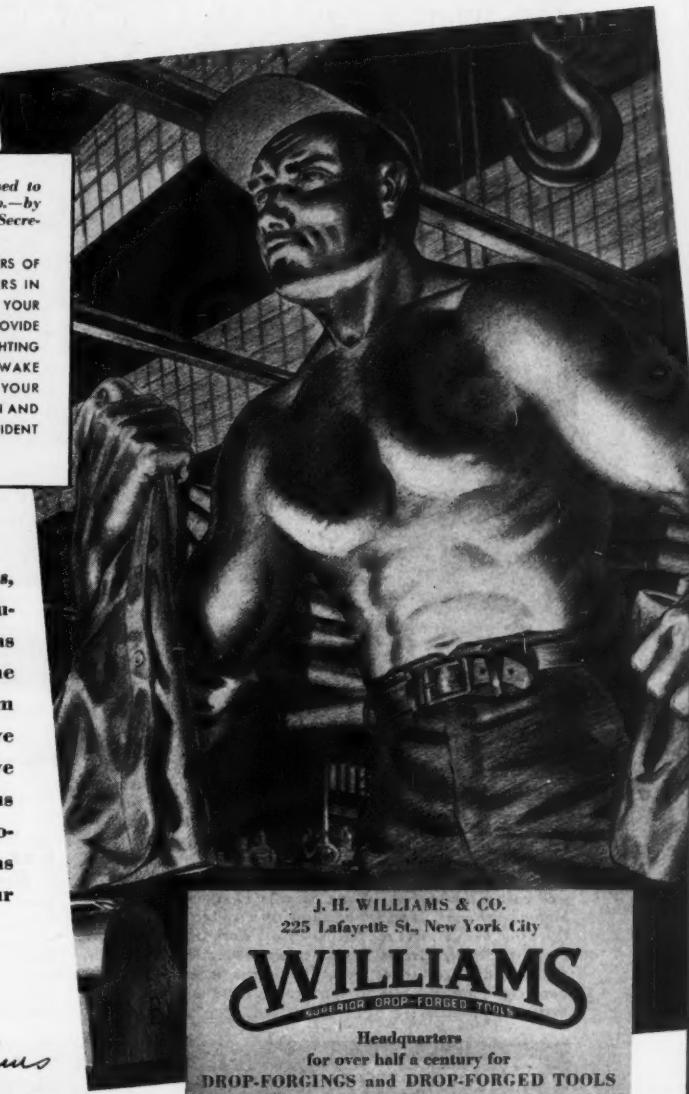
"YOU CAN COUNT ON US, MR. SECRETARY!"

The following message was addressed to the Employees of J. H. Williams & Co.—by the Hon. Robert P. Patterson, Under Secretary of War:

"THE ARMY IS CALLING ON YOU SOLDIERS OF PRODUCTION TO BACK UP OUR SOLDIERS IN THE FRONT LINES WITH EVERY OUNCE OF YOUR ENERGY. THE ARMY LOOKS TO YOU TO PROVIDE THE WEAPONS OF VICTORY. THE FIGHTING WEAPONS WE LACKED YESTERDAY AT WAKE AND MANILA WE MUST HAVE TODAY. YOUR CONTRIBUTION MUST BE PRODUCTION AND MORE PRODUCTION. AMERICA IS CONFIDENT OF YOUR ANSWER."

OUR answer is "Yes, Mr. Secretary. All two thousand of us here at Williams will back up our boys in the front lines. We'll give them the best tools and forgings we can make, just as fast as we can make them. Count on us for 'production and more production'... for the 'weapons of victory' to the limit of our capacity."

*The men who
work at Williams*



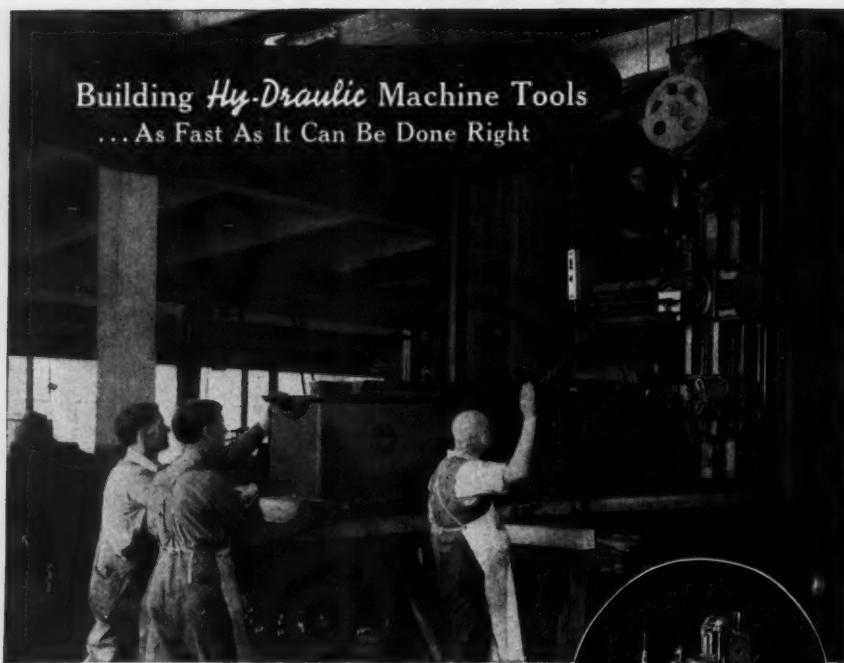
J. H. WILLIAMS & CO.
225 Lafayette St., New York City

WILLIAMS
SUPERIOR DROP-FORGED TOOLS

Headquarters
for over half a century for
DROP-FORGINGS and DROP-FORGED TOOLS

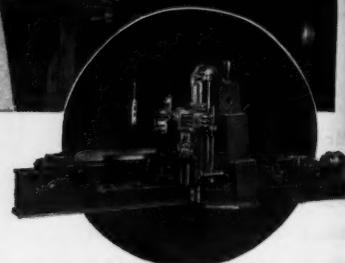


Building **Hy-Draulic** Machine Tools
...As Fast As It Can Be Done Right



Off To The Front... The *Production* Front!

Men and machines on the production front back up, more than ever, the men and weapons on today's battle front. The Hy-Draulic Shaper-Planer shown above is off to the production front. It may be going directly into Army, Navy, or Air Arm service; or into a civilian plane making ordnance, munitions or other materiel. Wherever the Shaper-Planer goes, it machines effectively a wide variety of work-pieces that are otherwise difficult to handle economically. Its hydraulic table-drive and hydraulic feed enable the operator to get out a large volume of accurate high-quality work in record-breaking time, and to do this easily. Openside design gives the Shaper-Planer extra large productive capacity. Shaper-Planers, like other Hy-Draulic Machine Tools, are booked ahead but we are building them as fast as it can be done right, and are glad to enter your orders now for earliest available deliveries.



Hy-Draulic Shaper-Planers 66" to 144" Stroke

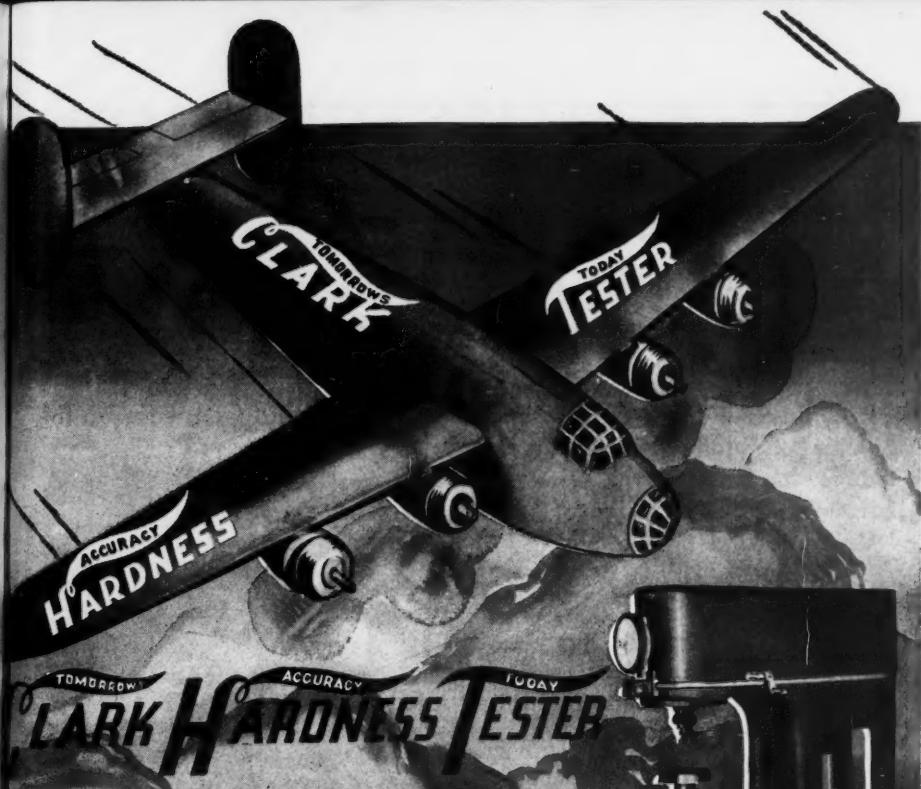
Get This Bulletin →

Bulletin illustrated shows features and specifications of Hy-Draulic Shaper-Planers, describes advantages of exclusive hydraulic table-drive and hydraulic feed. Write for your copy, today. Ask for Bulletin 3912.



Hy-Draulic
Rockford, Illinois

Shapers, Planers, Slotters, Shaper-Planers
ROCKFORD MACHINE TOOL CO.
ROCKFORD, ILLINOIS, U.S.A.



For "Rockwell Testing"

"This tester has been calibrated on the major load of 150 kg which consists of three calibrated weights (60 kg, 40 kg, and 50 kg) and on a minor load of 10 kg."

The Clark Hardness Tester embodies several new noteworthy features for instruments of this type; the most outstanding of which are the three adjustments for making compensation for minor difficulties. These adjustments are (1) Minor load adjustment; (2) Gap adjusting screw and (3) Indicator Holder.

The main beam on the tester is controlled by the use of a dash pot which also has an adjustment to either increase or decrease the speed at which the weights descend.

Every instrument is checked and tested for accuracy for making direct and conversion readings. The operator of this instrument performs the tests in exactly the same manner as on other instruments performing the "rockwell test," using the diamond penetrator or the 1/16 or 1/8 inch ball penetrators.

CLARK INSTRUMENT, INC.
10204 FORD ROAD • DEARBORN, MICHIGAN

SPEED UP DRILLING AND MILLING

Get the Most Out of Your Drills, Cutters and Tool Bits.

PROPER REGRINDING will permit faster speeds and feed; ease up the strain on production machines; reduce Machine Down Time; lower scrap and Conserve those Valuable and hard-to-get cutting tools.

• • • • •
An Oliver Drill Grinder — Cutter Grinder — Tool Bit Grinder will go a long way toward eliminating those bottlenecks in Production and Cutting Tools.

• • • • •
Now is the time to investigate savings possible with the ACE Cutter Grinder, the No. 510 Drill Grinder, the ARC Grinder for radius work and the NEW TEMPLATE TOOL BIT GRINDER.

• • • • •
"Send for literature today"

**Automatic Twist Drill Grinders, Face Mill Grinders, Tool and Cutter Grinders,
Point Thinner, Die Making Machines, Template Tool Bit Grinders**



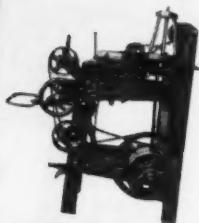
Cut illustrates Oliver 510 Automatic Twist Drill Pointer — One chucking—One setting—for drills $\frac{1}{4}$ " to 3"—Variable point angles —Variable clearance.

OLIVER INSTRUMENT COMPANY
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Adapting Invention and

Designing Skill
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Primary Industrial Needs..

A half century ago the inventive resource and designing skill of the Lipe organization blazed the way for many industrial ventures. For instance . . .



IN 1879
LIPE made this
BROOM-WINDING
MACHINE

because broom-winding
machines were one of
industry's primary needs

and Now in 1942, the

LIPE CARBO-LATHE

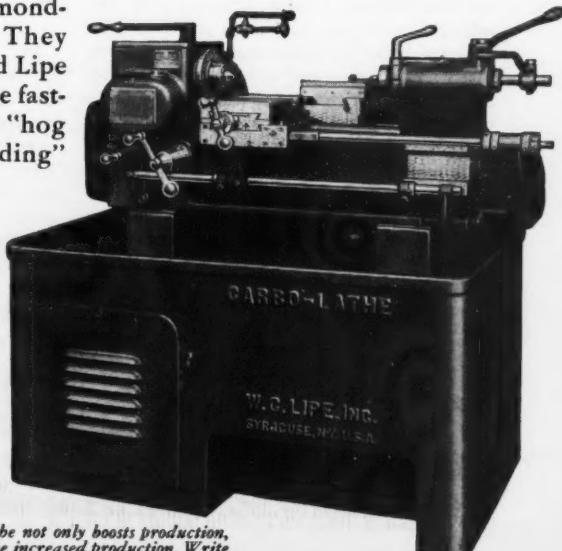
to meet the faster-cutting needs of mechanized warfare



America at war! America, the arsenal of democracy! Never before has there been so great a demand for cutting speed. Never before such tough alloys to cut.

Lipe engineers were quick to sense the possibilities in carbide and diamond-tipped tools. They built this super-fast, super-rigid Lipe Carbo-Lathe especially for these fast-cutting tools . . . especially to "hog off" tough steels to "rough grinding" tolerances.

It is a lathe with a new, non-distortion trussed-box base—extra strength and extra massiveness to resist the stress of heavier cuts through tougher steels at higher speeds. And they built it with the high spindle speeds for efficient, low-cost turning of die castings, plastics and other fast-cutting materials. All with high economy of tool wear, tool breakage and part spoilage.

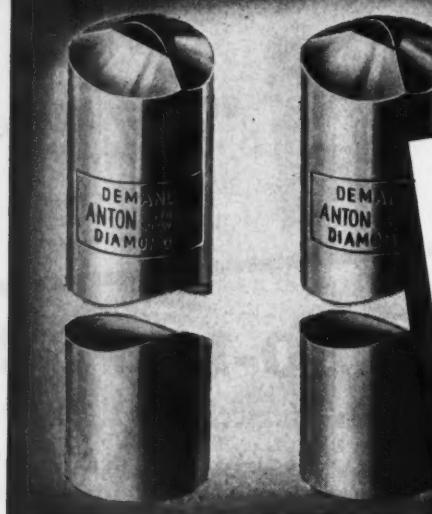


• Lipe Carbo-Lathe not only boosts production, it boosts profit on the increased production. Write now for specifications and detailed description



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Eliminate Grinding - Polishing - Lapping!



CUT and FINISH
in ONE Operation

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ASCO
DIAMOND
TOOLS

The use of "Asco" Diamond Cutting Tools for fine turning, boring, tapping and finishing operations, produces a mirror-like surface that, in most cases, eliminates need for subsequent grinding, polishing and lapping. This saving of an entire operation is a vital consideration in today's rush War production. In addition, "Asco" Diamond Cutting Tools cut at much higher speeds — cut to closer tolerances — maintain their precision cutting for much longer periods on toughest metals, alloys and compositions.

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BOUT of the O'TOOLS

TO ROUNDS—
AIR vs. HIGH-CYCLE
GRINDERS

WE WANT TO FIGHT FOR GREATER OUTPUT IN YOUR PLANT!

So far in this Bout of the O'Tools, HIGH-CYCLE and AIR have taken 2 rounds each:

Round 1—HIGH-CYCLE grinders boosted output 25%, saved \$1695 in first cost.

Round 2—Light-weight AIR grinders improved maneuverability, upped output 10%.

Round 3—HIGH-CYCLE grinders doubled production with 5 less tools, saved 75% in power cost.

Round 4—Light-weight AIR grinders made possible smoother results, cut maintenance costs 15%.

And the fight goes on! In fact, we're staging it daily in scores of plants—analyzing portable tool problems—finding ways to boost output and cut costs with either AIR or HIGH-CYCLE tools.

We'd be glad to tackle *your* problems in this unbiased manner to give you "all-out" portable tool output.

THE ROTOR ANALYST

"HIGH-CYCLE" Cat. 25
Free on request.



"AIR" Cat. 27
Free on request.

THE ROTOR TOOL CO.

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

WEBBER PRECISION GAGE BLOCKS

**IMMEDIATE DELIVERY TO MANUFACTURERS
SUPPLYING REQUIRED PRIORITY CERTIFICATES**

Set 81-B—Standard working set. 81 blocks in sizes from .050" to 4.000". Range 1.00" to 12.000" in steps of .001"; .200" to 12.000" in steps of .0001". Accuracy, .000008". Price, \$250.00.



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Set 40-B—Recommended for use in the toolroom and small production shop. 40 blocks in sizes from .100" to 4.000". Range .200" to 10.0000" in steps of .001"; .300" to 10.000" in steps of .0001". Accuracy, .000008". Price, \$150.00.



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Individual Blocks—For those requiring one or two gage blocks Webber furnishes individual standard size gages to meet such requirements.

The complete facilities of the Webber plant and personnel are also available for rechecking gages and replacing any that may have become too worn to maintain absolute accuracy. Webber service is complete. Try it.

12899 TRISKETT ROAD

WEBBER Gage Company
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The NEW IMPROVED

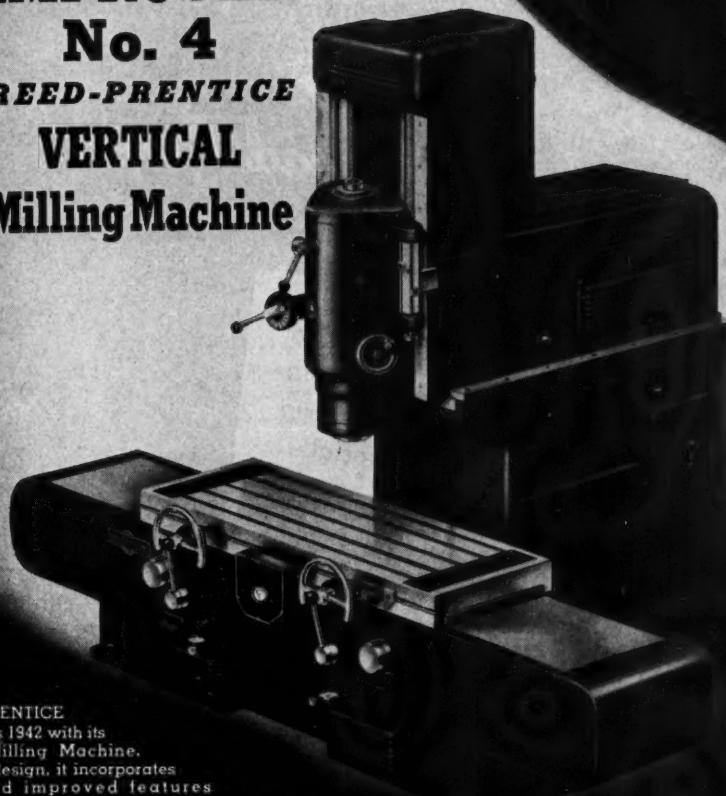
No. 4

REED-PRENTICE

VERTICAL

Milling Machine

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ANNOUNCES!*



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spotlights 1942 with its
No. 4 Milling Machine.
New in design, it incorporates
new and improved features
throughout such as:

1. Fluid drive through hydraulic motors to cross and longitudinal feed screws.
2. Centralized feed control levers.
3. Feed range from $\frac{1}{2}$ " to 37" per minute, cross and longitudinal.
4. Rapid traverse rate—180" per minute, cross and longitudinal.
5. Power rapid traverse to head with automatic stop for quick setting of cutter.
6. Spindle lock.
7. Spindle speeds controlled by single pre-selector lever and backgear.
8. All helical spindle gear drive providing 18 spindle speeds from 30 to 1170 R.P.M.

GENERAL SPECIFICATIONS

TABLE:	Working surface	24" x 70"
	Size overall	24" x 84"
RANGE:	Longitudinal travel of table	48"
	(Can be furnished 60")	
	Cross travel of ram	24"
	Vertical travel of head	12"
	End of spindle to table—Max. 24", Min. 12"	
	Throat depth	33"
MISC:	Top of table to under-side of ram ways	19 $\frac{1}{4}$ "
	Net weight	19,000 lbs.

REED-PRENTICE CORPORATION 1213 W. 3d St., CLEVELAND, OHIO
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Our plant has capacity for more Plug Thread Gage production in sizes $\frac{1}{4}$ " and up, both standard and special.

BATH Plug Thread Gages are made of High Speed Steel, "Ground from the solid after hardening," insuring long life and highest precision.

We welcome your inquiry.

N. C. and N. F. Plug Thread Gages, $\frac{1}{4}$ " to 1" in stock.



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WALKER-TURNER MACHINE TOOLS

Solve a "hundred and one"
War Production Problems!

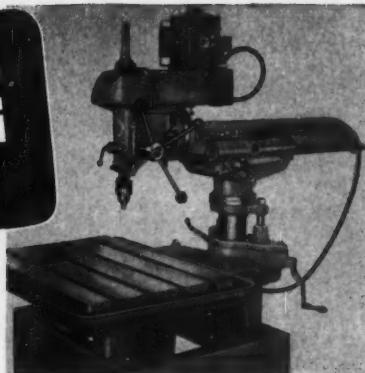
Giant battleships, huge bombers and heavy field guns get the headlines . . . but equally important are the thousands of small parts, accessories and countless lighter products that go into our vast War production. Here, Walker-Turner Machine Tools are proving "lifesavers" for aircraft, munitions, shipbuilding, electrical, tool-making and other war production plants . . . relieving large, costly machines for heavier work . . . easing machine tool shortages . . . performing every kind of operation on metals, wood and plastics.

Walker-Turner Machine Tools are carefully engineered for speedy, accurate production -- ruggedly constructed to stand up under 24-hour, 7-day week schedules. Volume production assures prompt delivery. Write today for the catalog of Walker-Turner Machine Tools and discover how many of these versatile machines fit immediately into your production set-up. Walker-Turner Co., Inc., 733 Berkman St., Plainfield, N. J.

METAL CUTTING RADIAL SAW. Cuts, saws, trims, grooves, profiles, shapes and miters metals, wood and plastics. Handles many sizes and shapes, including large flat pieces. Geared motor gets shaft closer to work, permits smaller wheels with greater rim force and increased cutting capacity.



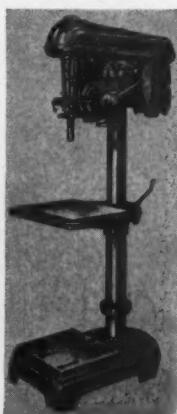
SPINDLE SHAPER for wood, aluminum, non-ferrous metals, plastics. Gared motor operates spindles at 7600 r.p.m. Has reversing switches, many useful accessories, other features.



RADIAL DRILL. Handles many light drilling, routing, tapping and profiling operations as effectively as larger machines costing 5 to 6 times as much. Drills to center of 62" circle. Head tilts 45° left or right. Maximum distance nose of chuck to table, 13½". Spindle traverse 3¾".

METAL CUTTING BAND SAWs. 14" and 16" models. Back gearing and cone pulley provide speed range from 61 to 5300 s.f.m. for cutting practically any material from tool steel to wood.

20" DRILL PRESS with smooth, positive Power Feed, operated by clutch and powered from drill press spindle. Drills to center of 20" circle. Holes from 1/16" to 1". Speeds 260 to 5200 r.p.m.



WALKER-TURNER MACHINE TOOLS FOR METAL, WOOD AND PLASTICS

DRILL PRESSES • BAND SAWS • BENCH SAWS • TILTING ARBOR SAWS • LATHES
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Bridgeport



TURRET MILLING MACHINE

Flexibility
Rigidity
Unparalleled
Range

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AN outstanding product weighing 1600 lbs. with unusual range for large tool and fixture work yet extremely sensitive for fine milling on molding dies.

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Also, high speed milling attachments for all makes of milling machines.

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STANDARD STOCK TOOLS

Finished Ground

METHOD

Vascoloy
RAMET

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5-METHOD COMPLETE TOOL SERVICE for MAXIMUM PRODUCTION



These standard stock tools are available with a choice of three grades of Ramet Cemented Carbide Blanks. With a variety of sizes in ten styles there are 164 standard tools in all.

Vascoloy-Ramet Standard Tools are finished ground ready to use. You can also reground any of them to obtain different cutting angles to suit particular cutting conditions. The generous size of the blanks permits the modification of these tools to meet many special or form tool requirements. With the three grades and the many sizes and styles, these standard tools will take care of the majority of all the turning, boring and facing operations on steel, cast iron, and abrasive materials.

Full particulars on all Vascoloy-Ramet Standard Tools and Blanks are contained in the new catalog and price list VR-421. Write for your copy.

*Prompt Delivery
on Standard Tools and Blanks*

VASCOLOY-RAMET
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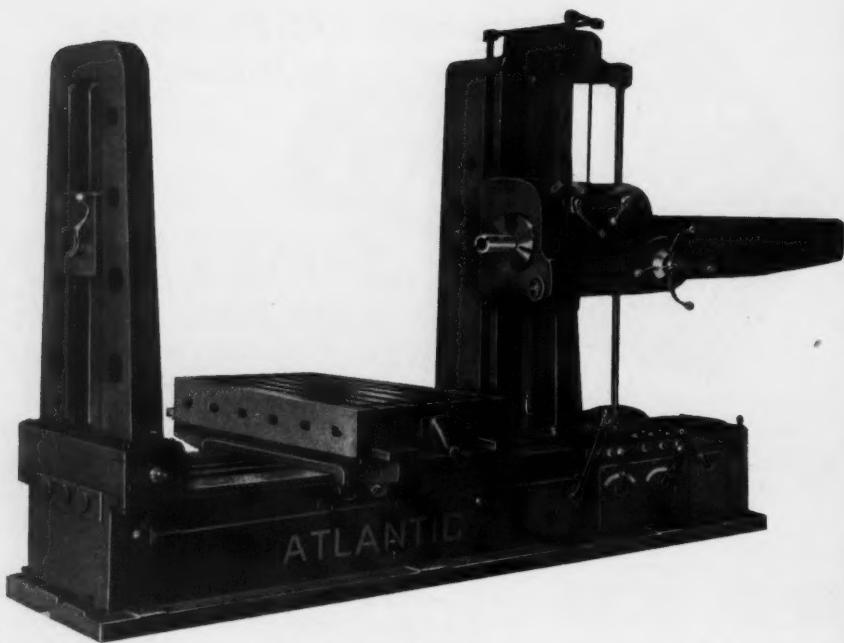
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4215

THE SUPERIOR TANTALUM-TUNGSTEN CARBIDE TOOLS



**4" and 5"
HEAVY DUTY
PRECISION TYPE**

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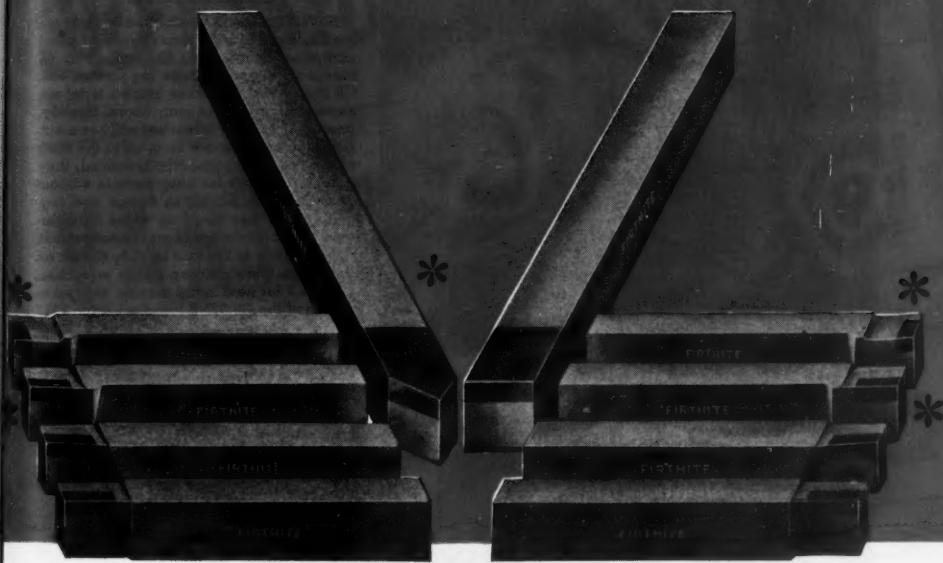
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Boring, Drilling and Milling Machines**

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**NEW YORK
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NOW AVAILABLE... 5 NEW* STYLES OF FIRTHITE GENERAL PURPOSE TOOLS



Five new Tool styles have been added to the FIRTHITE General Purpose Tool line to make a total of 10 styles... each in four to ten sizes and four standard grades of FIRTHITE Sintered Carbide.

"G. P." Tools are available now... from stock. This expanded line includes two new offset designs (in both right or left hand) and a diamond point style of wide usefulness.

Through these additions, the range of work has been broadened to include almost any turning, facing, boring, chamfering, undercutting, back-squaring, or grooving operation *without tool modification*.

Write for a new Firthite General Purpose Tool Price List.

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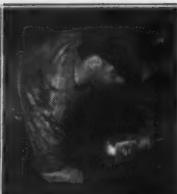
VANCOUVER, EDMONTON, WINNIPEG,

REGINA, HALIFAX, ST. JOHN'S.

CP WRENCHES SAVE THOUSANDS OF MAN HOURS

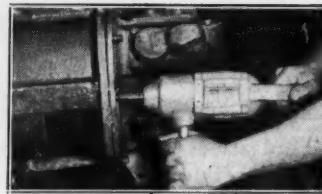
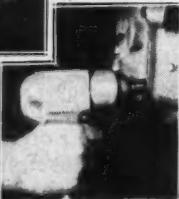


↑ ASSEMBLY TIME ON THIS PRODUCT was reduced materially by the use of this CP 349-RP Pneumatic Wrench (impact type). All CP Pneumatic Wrenches are simple in design and sturdy built. Slow speed rotary motors, absence of springs and gears in the driving unit and a minimum number of parts insure low maintenance.



↑ FOR NUTS, BOLTS, etc., up to $\frac{3}{8}$ " bolt size, the CP 360-RS has no superior. In assembly work and in maintenance jobs requiring nut removal or applications, the CP 360-RS wrench quickly pays for itself.

ONLY 6-5/8" LONG and weighing only $4\frac{1}{2}$ pounds, CP 344-RS is a midget among pneumatic wrenches—but a speedy, powerful tool that handles nuts up to $\frac{3}{8}$ " bolt size. Can also be used for lag screws, studs, ↓



↑ FOR RUNNING NUTS ON or backing them off, for the application or removal of bolts, studs, lag screws, etc., there is nothing faster or easier to handle than the CP 349-RP. Has exceptional speed and power for a wrench of its size. Handles nuts, etc., up to $\frac{3}{8}$ " bolt size.

SMALLEST, LIGHTEST of all impact wrenches. CP 357-RS is brand new. While developed originally for the airplane industry, it has wide adaptability for all types of light nut running, particularly for applications in close quarters. Handles nuts up to $\frac{1}{4}$ " bolt size. Weighs only 2 lbs. ↓



SPEED APPLICATION, REMOVAL OF NUTS, BOLTS, LAG SCREWS

Six Models, Handling Up to $1\frac{3}{4}$ " Bolt Size

NEW YORK—On production lines, in assembly work and in many types of plant maintenance requiring application or removal of nuts, bolts, studs, lag screws, etc., CP Pneumatic Wrenches (impact type) are saving thousands of man hours. Speedy, powerful, these CP wrenches will run a nut, bolt, stud or lag screw on or off in the wink of an eye. Light, properly balanced, they can be handled for long periods without undue fatigue. Simple in design and ruggedly built, they stand up under hard service with a minimum of maintenance cost.

In addition to the four models shown on this page there are two larger wrenches, CP 365-R for nuts, bolts, screws, etc., up to $1\frac{1}{4}$ " and the CP 375-R handling up to $1\frac{3}{4}$ " bolt size. Complete information on request.

CHICAGO PNEUMATIC
TOOL COMPANY

General Offices: 8 E. 44th St., New York, N. Y.



PNEUMATIC TOOLS

ALSO: Air Compressors, Electric Tools, Rock Drills, Hydraulic Aviation Accessories, Diesel Engines

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PRECISION



EX-CELL-O BUSHINGS
are held to a
high standard
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EX-CELL-O BUSHINGS
are available
in wide range of
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EX-CELL-O BUSHINGS
all conform to
A.S.A. STANDARD
in every respect.

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EX-CELL-O BUSHINGS
are made to
stand up beyond
the expected.

EX-CELL-O
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EX-CELL-O means PRECISION

IF IT'S SURFACE GRINDING . . .

You Need ABRASIVE!



No. 34 Specifications—A vertical spindle, reciprocating table grinding machine with automatic downfeed. It grinds work any size up to 24" long x 8" wide x 12" high. Takes 5" dia. Type 2 steel back cylinder wheel. Normal speed 3,050 r.p.m. Write for catalog.

Rotary Chuck—Individual motor driven rotating grinding attachment with 12" magnetic chuck is available for this machine. Particularly useful for accurately grinding small parts.



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BLADE WORN OUT?

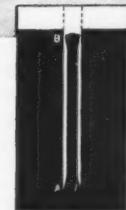
Just turn it over and
GO ON CUTTING!



That's the whole story: turn it over and go on cutting! Double-Life Blu-Mol, a Millers Falls exclusive, is a high-speed machine blade with teeth on both sides. Special set differential eliminates drag and wear on the trailing edge; special heat treatment, leaving edges hard and ends and center soft, makes it super-tough. Priced only 50% higher, this blade will give you twice the service of the best single-edged molybdenum blade you've ever used . . . proved in hundreds of shops nationwide.

TRY THIS BLADE

In the interest of your own business (cost cutting, efficient operation) and of America's war effort, (savings in steel consumption, shipping, storing, handling) determine DOUBLE-LIFE's value for your needs. Put in a requisition now. Savings begin at once.



IT WORKS THIS WAY

Place in machine in usual way, first edge (A) down. As blade submerges in slot, edge B, set narrower than edge A, clears work freely, undamaged. When A is dulled, invert blade. Edge B then cuts as fast and free as first edge.

DOUBLE-LIFE Hack Saws

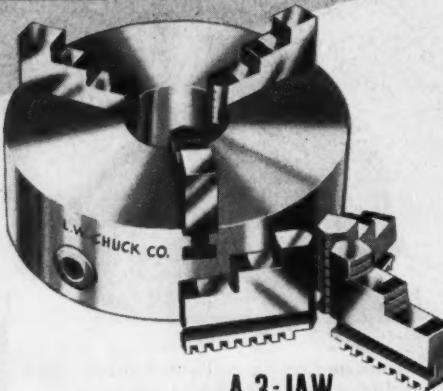


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3-JAW UNIVERSAL GEARED SCROLL



**\$75.00
ONLY 10½" SIZE
AVAILABLE AT
PRESENT**

A 3-JAW UNIVERSAL CHUCK

A 3-Jaw Universal Chuck combining strength with accuracy making it readily adaptable for either light or heavy duty work.

Body — Semi-steel casting, ruggedly designed for maximum strength.

Jaws — Steel, hardened and ground, accurately fitted. Set of reversible jaws furnished.

Scroll and Pinions — Made of high grade steel, accurately cut. T handle wrench furnished.

This chuck is guaranteed to run true, is desirable for either Lathe or Screw Machine work.

ALSO MFR'S OF
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to
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108

SAVE TOOLS.. TIME.. MATERIAL with SUNOCO



PERFORMANCE DATA

OPERATION — Combined drilling and facing

MACHINE — Jones & Lamson 7-A Saddle Type Universal Turret Lathe

CUTTING LUBRICANT — 1 part Sunoco to 15 parts water

Photo Courtesy of

JONES & LAMSON MACHINE CO.



SUN PETROLEUM PRODUCTS

HELPING INDUSTRY HELP AMERICA

SET A HIGH P-Q* FOR YOUR PLANT

Here's how to make a triple saving in your shop... and pave the way to a higher P-Q* (Production Quota). Put Sunoco Emulsifying Cutting Oil on the job!

SAVE TOOLS! Sunoco's high heat-absorbing and lubricating qualities prolong tool life... help keep tools sharper, longer. That's important today with high speed tool steel hard to get.

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TEST SUNOCO in your own plant... under your own operating conditions. Call in a Sun "Doctor of Industry" for specific recommendations. It's the first step toward setting a higher P-Q*. Write to **SUN OIL COMPANY, Philadelphia**.

*Production Quota

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EMULSIFYING
CUTTING OIL

FOR THAT PRODUCTION SPEED UP
...THESE MODERN
NIAGARA PRESSES
TURN OUT MORE PER HOUR

7 10 150 100 CAPACITY

NIAGARA

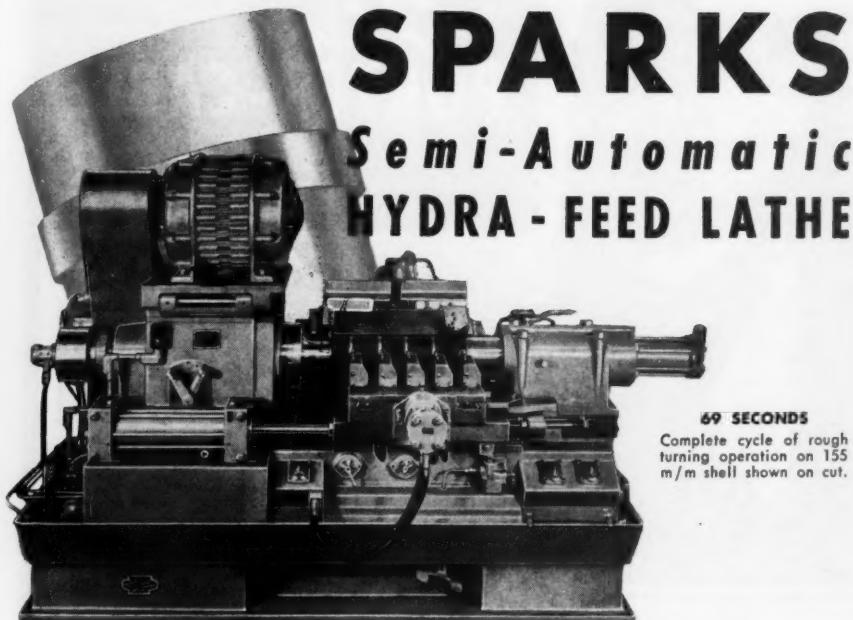
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SPARKS

Semi-Automatic HYDRA - FEED LATHE

69 SECONDS

Complete cycle of rough turning operation on 155 m/m shell shown on cut.

**for Machining All Sizes
of SHELL BODIES
from 75 m/m to 8" inclusive**

Shell forging is inserted in lathe, tailstock live spindle traversed hydraulically to locate shell on mandrel, at which time spindle automatically starts through hydraulically operated clutch. Carriage with slide controlled tools is moved hydraulically until outside of shell is completely turned. Simultaneously, rear slide tools are hydraulically moved into shell for facing base end and cut off open end to length. On completion of turning operation, pilot valve is automatically rotated by trip dog which puts feeds in rapid traverse to return carriage and rear slide to their starting positions. Spindle is stopped automatically in 2 seconds through hydraulically operated brake. Operation of foot-treadled valves mounted on floor release pressure on expanding mandrel and traverse tailstock spindle to permit quick recovery of turned shell.

Write for complete details covering operation and production features and specifications of this simply operated lathe.

**SPARKS
HYDRA-
FEED
LATHE**

**SPARKS MACHINE TOOL CORP.
NORWALK CONNECTICUT**



• A radius of 9.845" had to be generated on a No. 1 alloy part of tough bronze. Tolerance .002" plus or minus. Production by a skilled worker on a milling ma-

chine was four pieces per hour. With a semi-skilled worker, Porter-Cable Belt Grinder turned out better than 20 pieces per hour!

New PORTER-CABLE WET-DRY G8

... the Precision Belt Grinder
SPEEDS PRODUCTION
... CUTS COSTS!

This is a MUST, says D. M. Nelson—"To hold the point of view which sees no necessary accomplishment as impossible, which looks on obstacles only as things which are to be knocked out of the way, and which is ready to try any new routine, any new device, any new way of doing things, in order to get results."

Thousands of shops have already found a "new routine . . . a new device . . . a new way of doing things." It's the Porter-Cable Wet-Dry G8—the revolutionary new-type machine that's brought precision as well as speed to belt-grinding!

As a production man, you owe it to yourself to know about the G8—how it relieves and supplements major machines—how it works on hard and soft metals, alloys, plastics, hard rubber—how it "belt-machines" to tolerances as small as .0005" — how it smoothes the flow of work.

We'd like to demonstrate the G8—on one of your own jobs. Without obligation, we'll prove that Wet-Dry belt grinding will help you get greater production at less cost! Phone your local Porter-Cable man today, or write us direct.

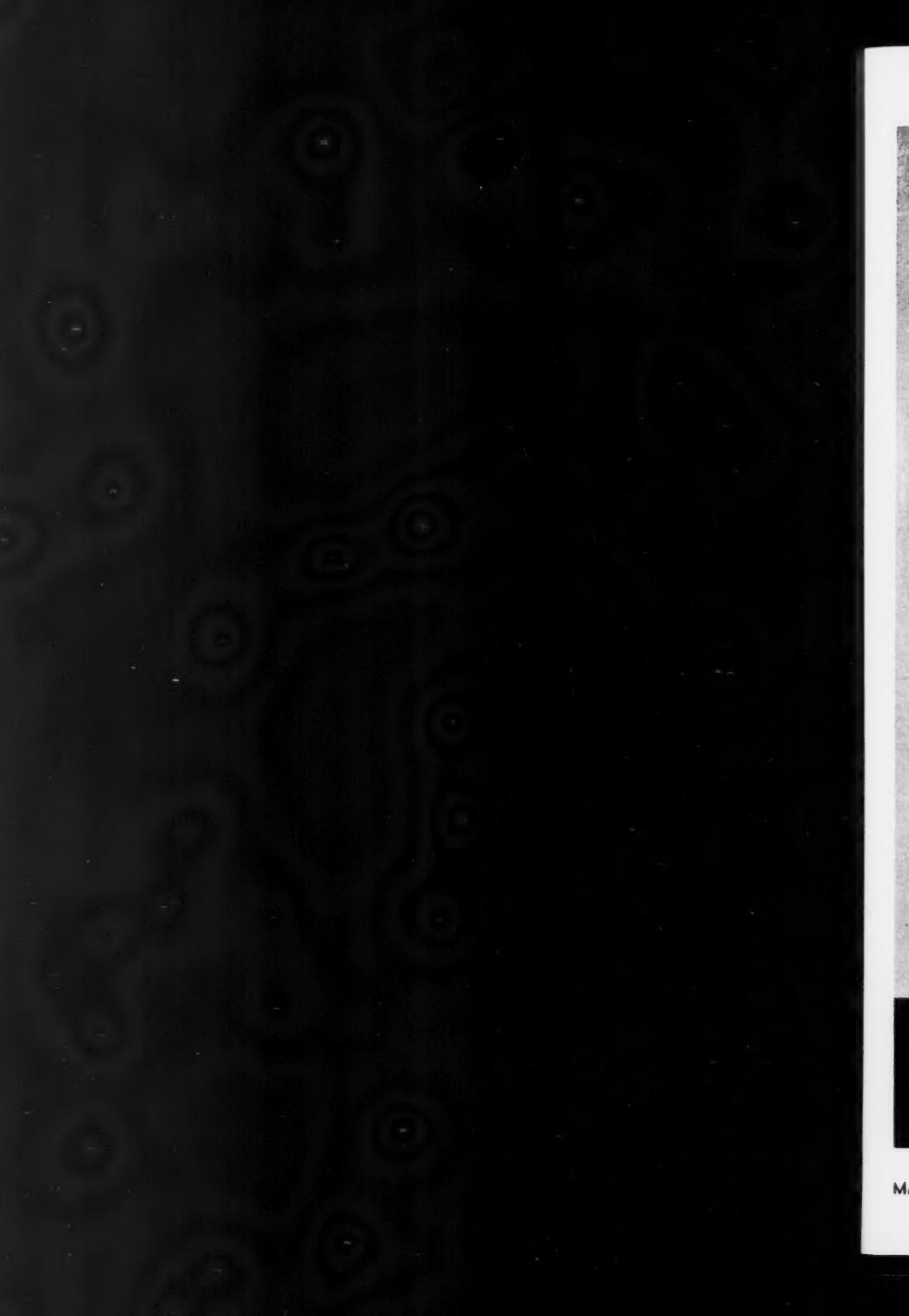
FREE — Third edition of "Wet-Dry Belt Grinding in the Spotlight," tells where, when and how to use this new machining method. Write for your copy today!



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MONTEED WHEELS • MOUNTED POINTS



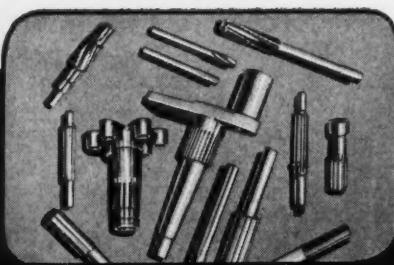
You should have this new fully illustrated catalog. In its 32 pages may be found list prices, speed recommendations, mandrel information and other important data indispensable to portable grinder owners.

It is just off the press and is yours for the asking.

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ABRASIVE PRODUCTS CO., WESTBORO, MASS.

ACCURATE SPLINES

Speed Gear Train Assemblies and
wear longer in service



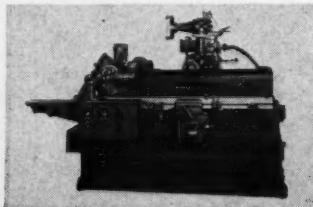
FITCHBURG
Automatic Closed Cycle Grinding
Insures Accuracy

A T N E W L O W C O S T

No longer need you put up with the excessive cost of spline grinding by familiar methods. Thirty years of precision grinding machine development have culminated in the new Fitchburg Automatic closed cycle machine, on which new operators can rapidly be trained to produce accurate splines at high speeds.

This technique saves on assembly time, divides torque pressures more evenly and produces finishes that give more even wear on sliding splines. Result is lower costs, better profits and smoother product performance.

New free booklet pictures principal features of this machine. Write for your copy today.



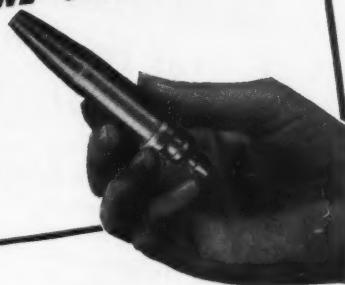
FITCHBURG

GRINDING MACHINE CORP.
2008 FALULAH ROAD
FITCHBURG, MASSACHUSETTS, U.S.A.

20% to 30% FASTER!

THE NEW Airco "45" High Speed MACHINE CUTTING TIP*

....A PRECISION TOOL
GEARED TO THE DEMAND
FOR HIGH PRODUCTION



In hundreds of field tests, the Airco "45" has demonstrated its capacity to greatly increase production by decreasing the time required to cut metal up to eight inches thick by 20% to 30%.

The Airco "45" High Speed Machine Cutting Tip has a nozzle with a divergent exit portion—a design that permits a narrow, high velocity stream of oxygen, practically free of exit turbulence. A stream of oxygen from the Airco "45" burns away a narrower cut, or kerf, of metal than the conventional tip. As a result of cutting away less metal, the tip cuts faster, precisely and more economically. > > > To obtain full value it should be used on oxygen pressures of 85 psi or higher.

*Method Patent No. 1985080



An interesting booklet points out the many advantages that are yours with Airco "45" Tips. Write on your company letter-head for a copy today.

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MAGNOLIA-AIRCO GAS PRODUCTS CO.

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ESCO MIJIT DRILL JIGS

*for fast, accurate drilling
of small parts*

★ Their low cost, quick clamping and light weight make them indispensable for rifle parts, airplane parts, machine gun parts, gun sights and mounts, etc. Wedge-type locking-unit locks with handle in any position as soon as bushing plate touches work. Four models and a range of sizes are available for immediate delivery.

Write for catalog and prices.

ALSO STANDARD DRILL JIGS AND JACK LOCKS.

ESCO ENGINEERING CORP.
4855 FOURTH AVE. DETROIT, MICHIGAN

Model C

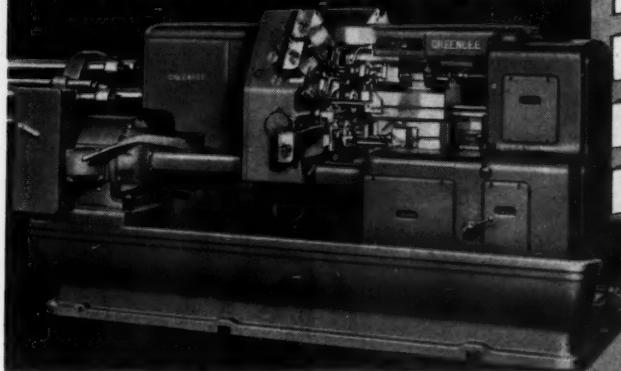
Model B

Model E

Model A

GREENLEE

Automatic Screw Machines



SPEED
ACCURACY
ACCESSIBILITY
COMPACTNESS
QUICK SET-UP
FLEXIBILITY

**Built to Stand the Wear
and Tear of Today's
Production**

Every Greenlee Automatic Screw Machine turned off the assembly floor has been built right to measure up to the highest standards of quality and accuracy obtainable . . . built right to give the speed and accuracy that is daily saving vital seconds in the production of the shells, aircraft parts, gun parts and munitions so essential to this nation's safety. And built right to stand the wear and tear of today's unusual production demands. Even in our hurry to build more machines for Defense Work, there are no short cuts to quality. When this emergency has passed, Greenlee Machines will still be turning out ordinary peace-time parts just as fast and just as accurately as they now produce defense work.

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THESE FEATURES

Fast and easy cross-slide tool adjustment

All controls within easy reach of operator

Wide range of speeds and feeds

End-working slide controlled by movable dogs, no cams required

Six independent cross slides actuated by standard interchangeable cams

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BROS. & CO. 
ROCKFORD ILLINOIS U.S.A.



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NEW FEATURES -- HEAVY DUTY
FAST • ACCURATE • SMOOTH



HERE IS A CAREFULLY ENGINEERED AND STREAMLINED MACHINE. ITS ADAPTABILITY AND FLEXIBILITY IN HANDLING ALL TYPES OF CUTTING IS ALMOST UNBELIEVABLE. THROUGHOUT THE MACHINE ARE FEATURES ANY ENGINEER WILL APPRECIATE. THESE FEATURES ASSURE YOU OF YEARS OF TROUBLE FREE SERVICE.

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Attention Dealers! Sales Franchises still open for a few territories

Keep Your Assembly Lines Stepping!

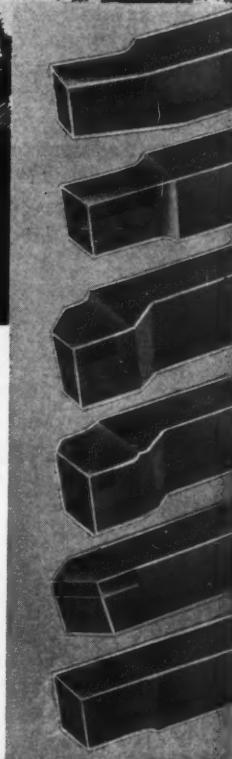


Machine Your Parts *Faster* With
TECO CARBIDE TOOLS

Assembly lines can move no faster than the supply of parts permits. Where machined parts are involved, the machine shop often sets the pace for the entire plant.

Increase your parts production, by speeding up machining operations with TECO Carbide Tools. Run your machines at capacity—get more pieces per grind—save down-time for re-tooling—hold accurate tolerances for longer runs—reduce rejects. No idle claims these, but FACTS proved every day in the nation's largest machine shops.

TECO Carbide Tools, in grades and styles for practically every machining need, are available for prompt shipment.



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Branch Office: 2906 Euclid Avenue, Cleveland, Ohio

Pioneers in Tungsten Carbides for Over a Quarter Century

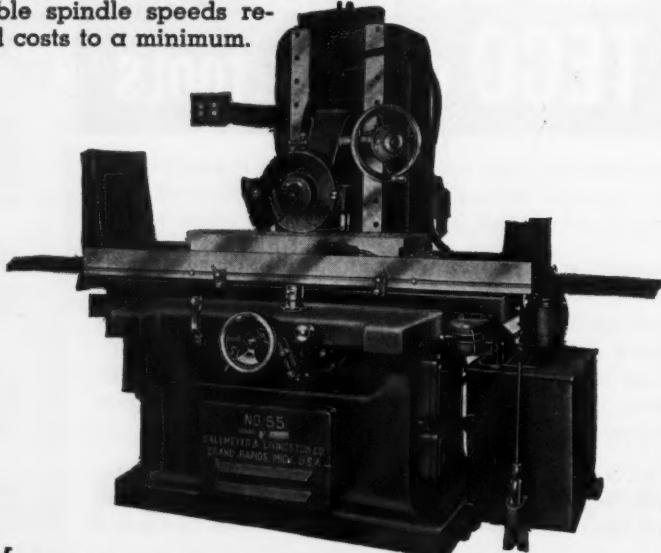


*Hydraulic
feed*

GRAND RAPIDS Surface Grinders

**To Meet 1942's Exacting
Needs --- as nothing else can**

- "Grand Rapids" Hydraulic Feed Surface Grinders guarantee tool room accuracy at table speeds up to 125 feet per minute.
- Heavy rugged one-piece column and base casting assures permanent alignment between the cross travel ways and the upright head.
- Patented vertical movement of wheel head makes it possible to split thousandths.
- Two usable spindle speeds reduce wheel costs to a minimum.



**Write for
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No. 55 Precision Tool Room Type

GALLMEYER & LIVINGSTON CO.
308 STRAIGHT AVE. S. W. GRAND RAPIDS, MICHIGAN

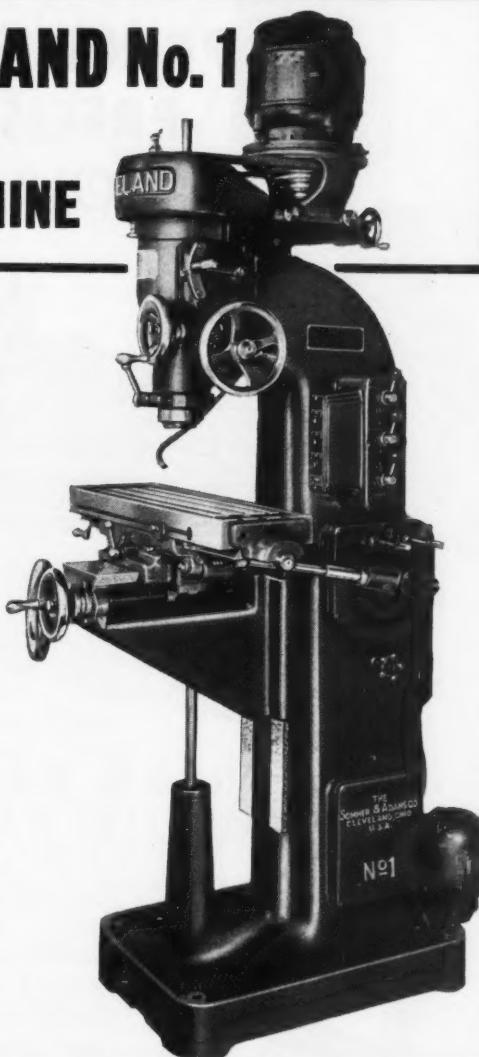
The CLEVELAND No. 1 VERTICAL MILLING MACHINE

Designed to meet the steadily growing demand for a small, rigid, high speed Vertical Spindle Milling Machine — a machine whose design embodies all essential features required by the modern Toolroom, Die and Mold Shop and by Production Plants.

It is a completely new machine, designed and built with all these requirements in mind, by a company whose principal business for 20 years has been creating special machines for the high production industries.

Longitudinal feed is 18"; cross travel, 8½"; and vertical travel, 16". The table has a working surface 8" by 32". Two optional ranges of 12 spindle speeds each are offered, from 100 to 1750 r.p.m. or 200 to 3450 r.p.m.

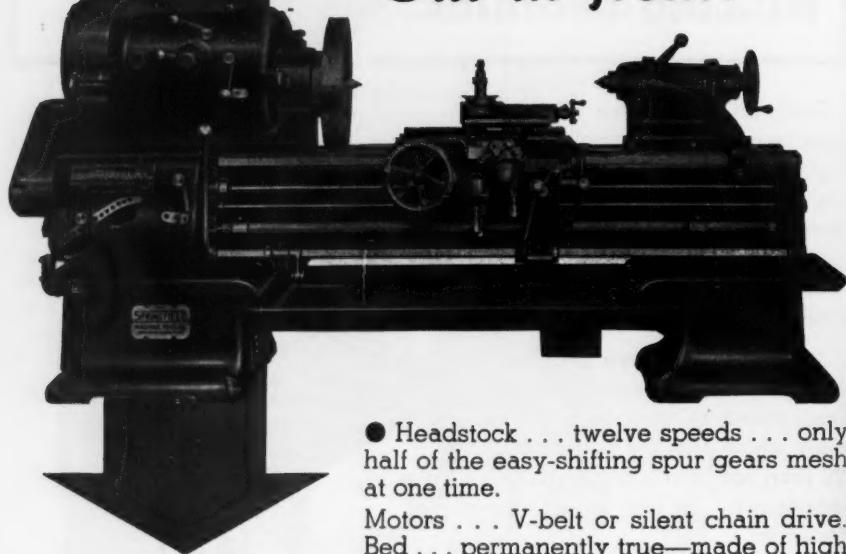
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THE SOMMER & ADAMS CO.
18511 EUCLID AVE. CLEVELAND, OHIO

SPRINGFIELD PRECISION LATHE

Out in front!



● Headstock . . . twelve speeds . . . only half of the easy-shifting spur gears mesh at one time.

Motors . . . V-belt or silent chain drive. Bed . . . permanently true—made of high test alloy to resist warp or marring under severe service.

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Compound rest . . . sturdy, firm.

Tailstock . . . all bearings and bed ways oiled from one well.

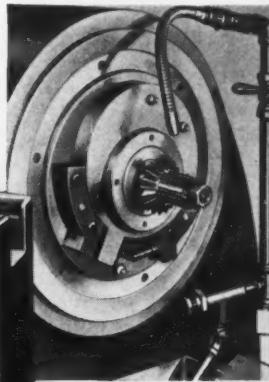
From headstock to tailstock—the SPRINGFIELD Lathe is **out in front!**

THE SPRINGFIELD MACHINE TOOL CO.
SPRINGFIELD OHIO. U.S.A.

PRODUCE PRECISION Internal or External THREADS . . . FASTER



Below is shown set up for internal threading, the milling hob is revolved eccentrically about the work and simultaneously rotated into the work for the full depth of the thread. The cutter then rotates on its own axis and is carried around the work and simultaneously advanced by means of a lead screw to produce the desired helical thread.



with the

NEW MURCHEY No. 32 THREAD MILLING MACHINE

Above is shown the spindle nose equipped with a hardened and ground 12-cutter thread milling head for cutting external threads from 1" up to and including 4" in diameter. The same eccentric milling action is employed as in the cutting of internal threads described above.

We also manufacture all types of Collapsible Taps, Self-Opening Die Heads, Bolt and Pipe Threading Machines and Pipe Cutting-Off Machines.

Featuring a unique eccentric milling action described above, the new Murchey Thread Milling Machine is setting new records for speed and precision in the production of munitions threads. For example, on one job it is cutting a 2-7/16" thread in the base end of anti-aircraft shells faster than one a minutel Internal or external threads from 1" to 4" in diameter and up to 3" in length. Maximum efficiency in operation is obtained through the completely hydraulic work cycle and the Reeves variable speed drive which permit the selection of exactly the right speed and feed for every job. And in the cutting of deep, coarse threads, the heavy box-type bed and the keyway in the fixture table help to maintain rigidity and perfect alignment. If you are looking for increased speed and maximum accuracy in munitions and aircraft threading, let us send you further details of the latest Murchey thread production equipment.

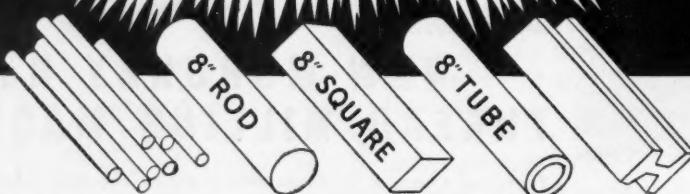
THE MURCHEY MACHINE & TOOL COMPANY
951 PORTER STREET, DETROIT, MICHIGAN

VERSATILITY *plus*



Now Built in three Sizes
No. 5—5" dia. round or
5" x 10" flat.
No. 8—8" dia. round or
8" x 16" flat.
No. 12—12" dia. round or
12" x 16" flat.

Also the No. 9 Upright
Saw.



WELLS Metal Cutting Band Saws Accurately Handle a Variety of Jobs

Each day, even each hour, may bring a new and different job to the Wells Metal Cutting Band Saw—but each will be handled speedily, accurately, at the lowest cost. These dependable saws are

expertly engineered and are designed to do a wide variety of work. They are portable and can be quickly moved where needed. Learn today what Wells Saws can do for you.

WELLS MANUFACTURING CORP., Three Rivers, Michigan



NAVY "E"

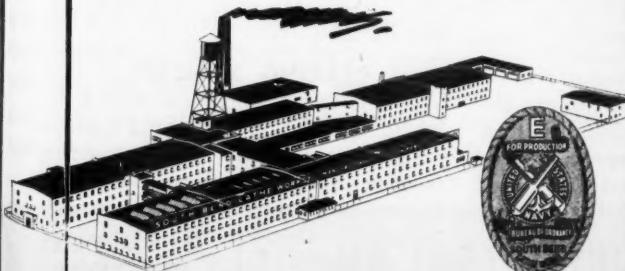
Awarded to

SOUTH BEND LATHE

The Navy Ordnance Flag and "E" Pennant have been awarded to the South Bend Lathe Works for outstanding performance in the production of ordnance materiel for the U. S. Navy.

For years South Bend Lathes have served our Navy. More recently—since Defense demands have called for vastly increased machine tool production—South Bend has been "ahead of schedule" in the production of lathes.

Permission to fly the Navy "E" Pennant and to wear the "E" on our lapels, is an honor. These emblems serve as recognition for work well done—and as a reminder of the tremendous job that lies ahead. We will do our part to help finish it.



SOUTH BEND LATHE WORKS

974 E. Madison St., South Bend, Ind.

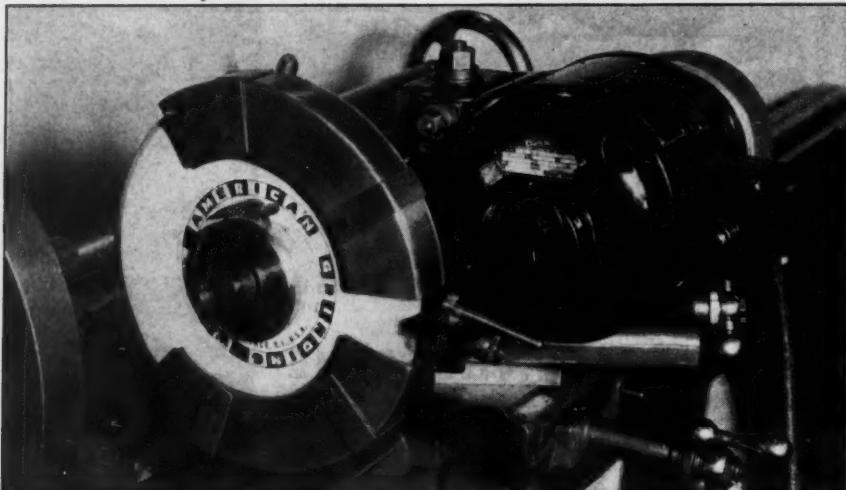
Lathe Builders for 35 Years



SUPER-PRECISION GRINDERS

For LATHES, SHAPERS, MILLING and BORING MACHINES

A Full Line of Portable Precision Grinders that Produce a Finish and Accuracy Not Before Attainable with a Portable Tool



Model "M" 1 H.P. Grinder with thread dressing attachment

BALL BEARING SPINDLE

Our Super-Precision Grinders are built around a Ball Bearing Spindle of new design, developed by years of research and experimentation. It is manufactured to the closest tolerances for balance and accuracy that mechanical skill can produce. As a result, the finish produced by this portable grinder compares favorably with that produced by a large cylindrical wet grinding machine.

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An important feature of our grinders is that they are built to grind threads efficiently and accurately. A dressing attachment can be supplied to form any thread form. Threads like on taps and thread gauges, can be ground full depth from

the solid after the part is hardened practically as fast as they can be cut with a tool in the soft steel, and to far greater accuracy and better finish.

3 STANDARD SIZES

1/3 H.P. Motor. For wheels up to 6" dia.
1/2 H.P. Motor. For wheels up to 6" dia.
1 H.P. Motor. For wheels up to 10" dia.
EXTRA LONG QUILLS FOR GRINDING DEEP HOLES ARE AVAILABLE IN 8", 12" and 18" LENGTHS.

BALL BEARING SPINDLES

We manufacture high precision ball bearing spindles for all makes and types of machine tools. Also special grinding machines equipped with our famous ball bearing spindles.

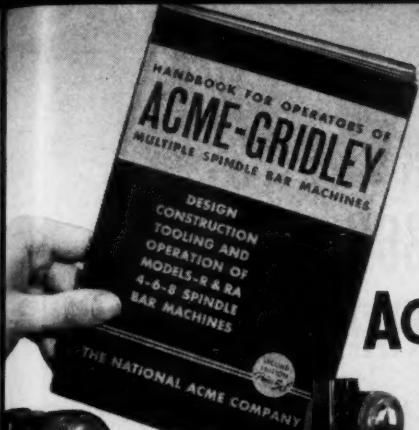
GENERAL MACHINE TOOL CO.

SENECA FALLS
NEW YORK

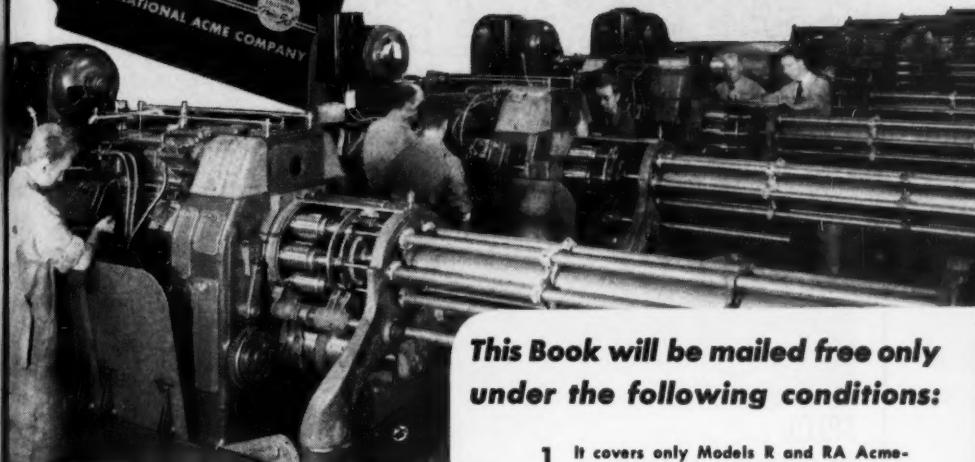
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HERE'S *Help* FOR THE NEW ARMY OF ACME-GRIDLEY OPERATORS



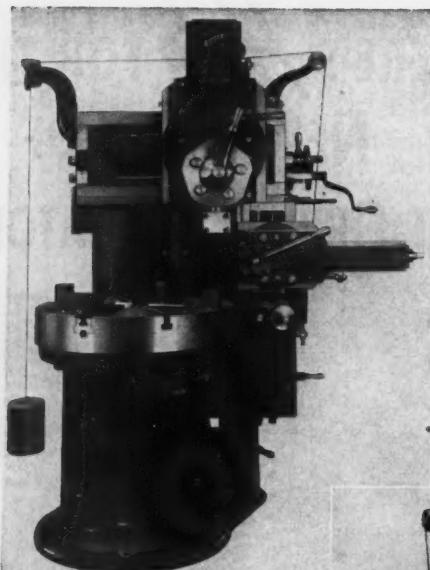
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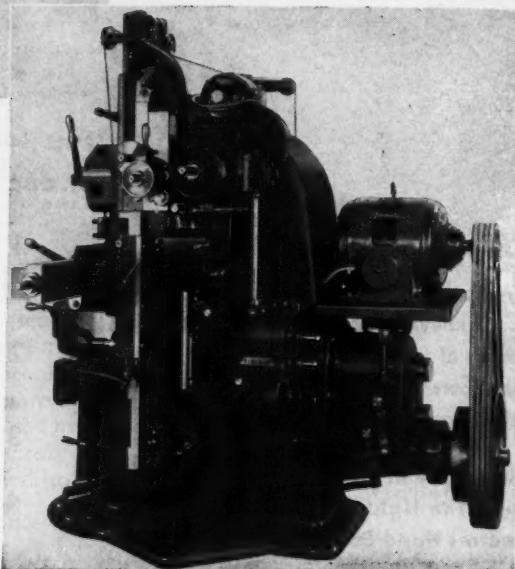
ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • SCREW MACHINE PRODUCTS • THE CHRONOLOG • LIMIT SWITCHES • POSITIVE CENTRIFUGE • CONTRACT MANUFACTURING



(Front View)

SPEED
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Manufactured By:
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"YANKEE" OFFSET



No. 3400 — ACTUAL SIZE

"YANKEE" No. 3423 in use on
motor car in which interior trim
and fittings are fastened with
Phillips Recessed Head Screws.

For shop, home, car,
every good workman
will want to own one or both
of these new OFFSET tools with
Famous "Yankee" Ratchet.
They drive or draw screws in
hard-to-get-at places, simply
by moving handle back and
forth . . . more powerful than
8 inch vertical screw driver.

"Yankee" No. 3400, Offset
Ratchet Driver has $\frac{1}{4}$ " and
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"Yankee" No. 3423, has No. 2
and No. 3 Phillips Bits, needed
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used in many of the new cars.
Ask for "YANKEE" offset
drivers—at Hardware Stores
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**"YANKEE" on the tool you
buy means the utmost in qual-
ity, efficiency and durability.**

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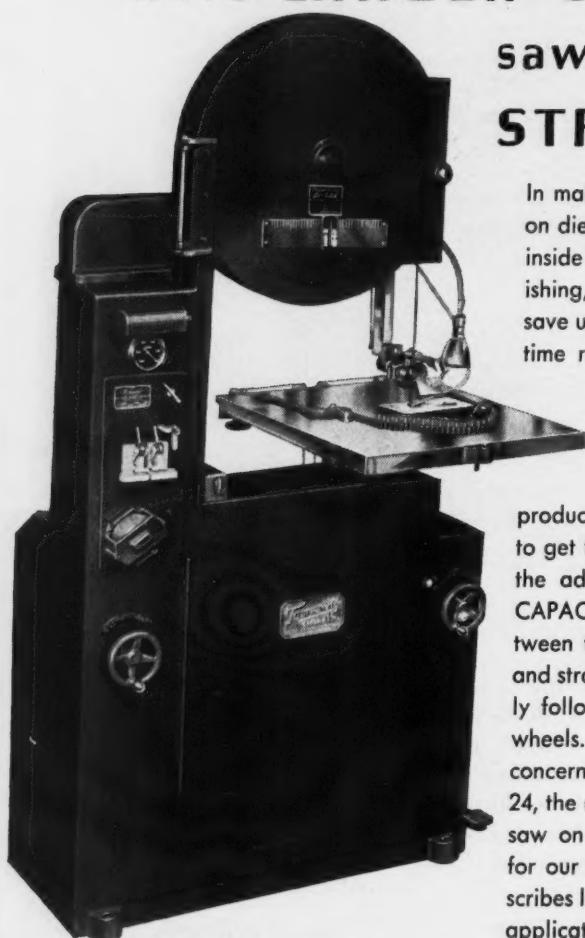
Send FOLDER "MS" showing new "Yankee"
Offset Ratchet Drivers..Adapters..Offset Kits for
speedy close-quarter work with screws and bolts.

SIGNED.....

Address.....

Tanne with DI-SAWS

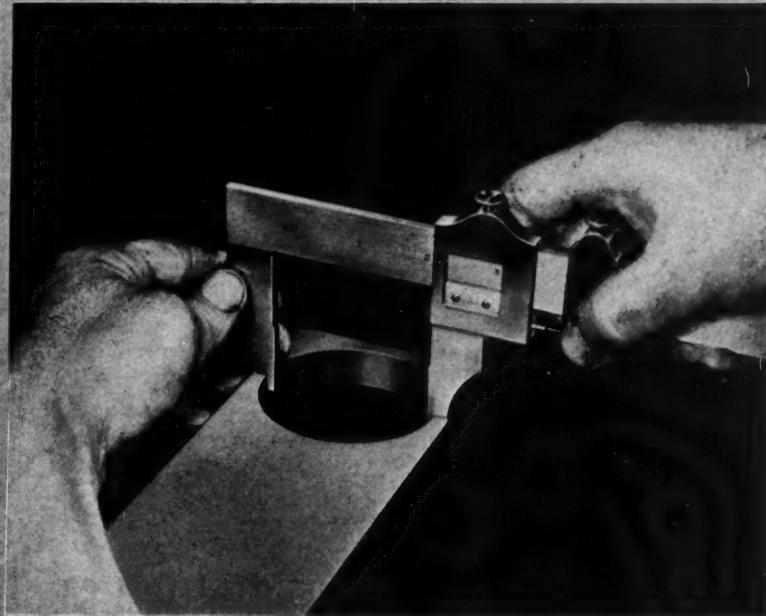
have **LARGER CAPACITY,**
saw *Easier,*
STRAIGHTER



In making inside and outside cuts on dies, tools, jigs, etc., as well as inside and outside filing and polishing, the modern die saw will save upwards of 70 per cent of the time required by ordinary methods and reduce costs proportionately. Don't overlook this great opportunity to step up both production and profits. But be sure to get the machine that gives you the added advantage of **EXTRA CAPACITY** (a full 24 inches between the blades) and the easier and straighter cutting that naturally follows from the use of larger wheels. Get the complete facts concerning the TANNEWITZ M-24, the most highly developed die saw on the market. Simply write for our DI-SAW Bulletin. Also describes larger DI-SAWS for special applications.

THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN

The Measure of
SUPERIORITY



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VICTORY will be assured once America's fighting forces are supplied with more and better equipment. In striving for increased production, remember that volume is worthless without accuracy. Starrett Tools speed work along through production and inspection with sure, unfailing accuracy. They inspire extra confidence that results in greater efficiency, better, faster work. Write for Starrett Catalog No. 26 MD.

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BRADFORD'S Contribution to the Battle of Production

Here are several reasons why the "Metalmaster" is being put in the front line of production's battle:

High carbon molybdenum spindle rolls on heavy duty, preloaded, precision, tapered roller bearings. Nickel alloy steel gears are heat treated and shaved, and lapped to close tolerances. 12 speeds, from 16 to 400 r.p.m. (Higher ranges can be furnished.) Spindle is hollow for draw-in attachments. Wide range quick change gear device. Constant speed standard frame motor is mounted on adjustable hinged plate in leg. Drive is through multiple V-belts and multiple disc clutch. Multiple disc brake effects jogging. Starting, reversing and stopping is quickly controlled. (Also apron mechanical clutch control for starting and stopping.) Automatic lubrication. Made in 12", 14" and 16" sizes.

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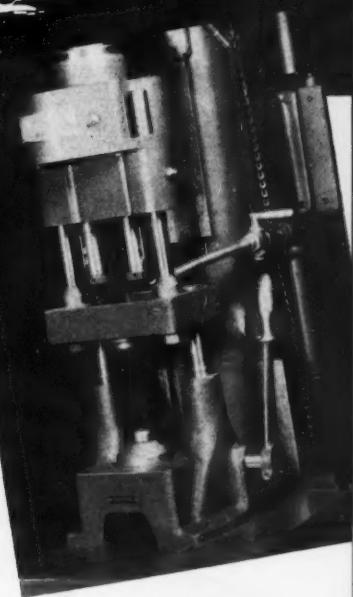
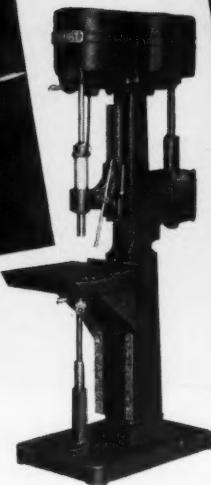
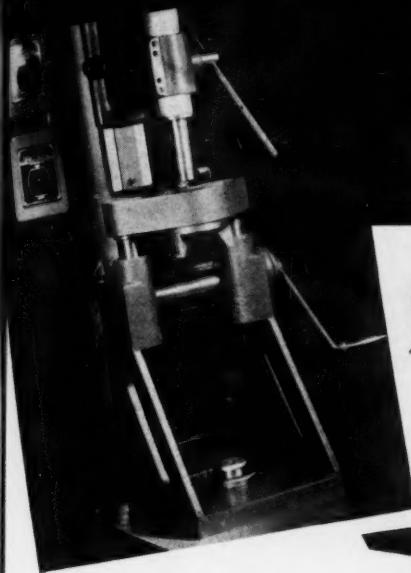
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CINCINNATI

OHIO



SPECIAL TOOLING FOR *Ordnance* WORK



- When parts must be made in large quantities, Footburt sensitive drilling machines arranged with multiple heads and holding fixtures become inexpensive special machines.

The accurate, sturdy construction of Footburt sensitive drills makes them suited for this type of ar-

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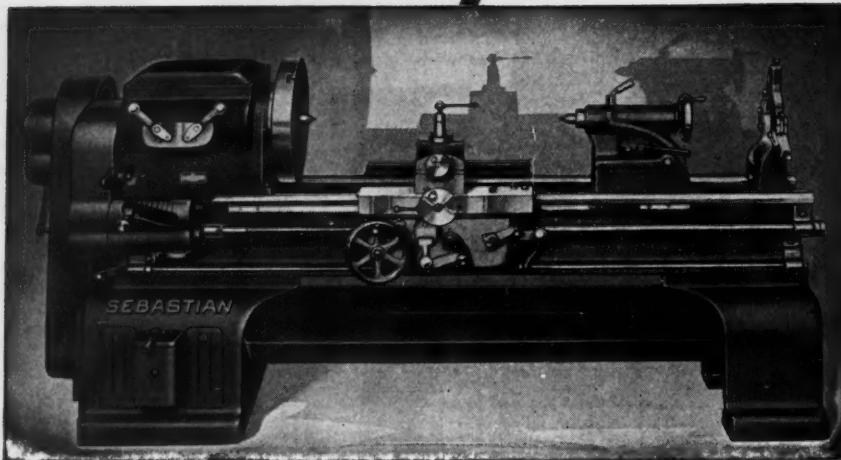
THE FOOTE-BURT COMPANY
CLEVELAND, OHIO

Detroit Office: 4-253 General Motors Building

FOOTBURT

Sensitive
DRILLING MACHINES

See
SEBASTIAN LATHES
First!



Here are the principal features of all
SEBASTIAN Type H Lathes . . .

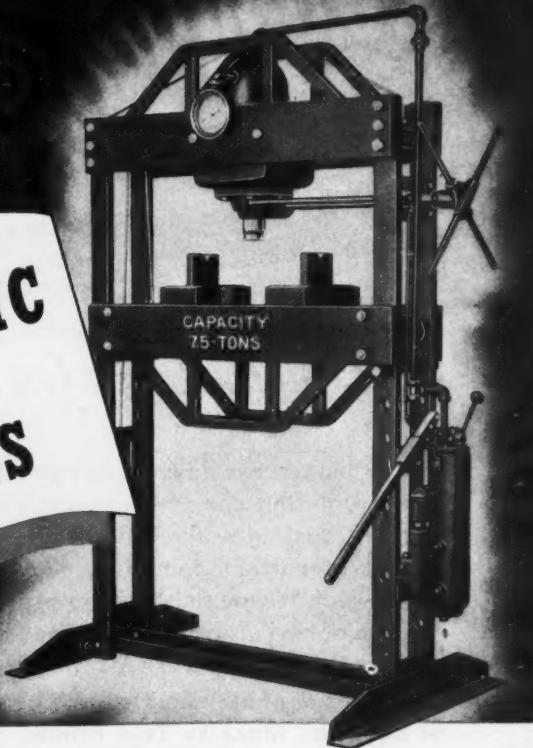
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DESIGNED for SPEED and EASE of OPERATION

Every KRW feature contributes to SPEED — Speed in getting the ram to the work — Speed in developing required tonnage pressure — Speed in raising the ram to remove the work.

Send for your copy of the new 16 page bulletin describing in detail the NEW 2 Speed Pump — The Lever Controlled Valve that opens or closes with a flip of the Ball Arm — and many other patented features found only on KRW Presses.

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EXPORT OFFICE: 90 WEST ST., NEW YORK, N.Y., U.S.A.

WEST COAST: Osborne Mach. Co., San Francisco, Calif., U. S. A.

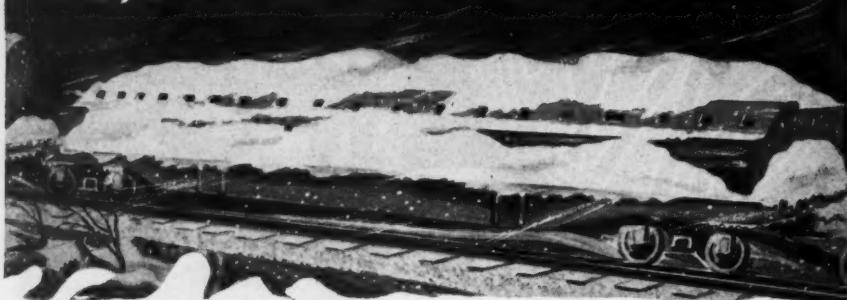
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...protected by a few lbs. of FINISH!

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A line to us will bring you this data without any obligation on your part, of course.

THE EGYPTIAN LACQUER MANUFACTURING CO.
ROCKEFELLER CENTER
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EGYPTIAN Superior FINISHES

CINCINNATI

HYPRO PLANERS



"step-up" production for prominent Eastern Machine Tool Manufacturer

• Designed and built for high production of all types of planer work, this 36" Cincinnati Planer is aiding a prominent eastern manufacturer to increase the production of machine tools to meet the needs of the present emergency. Two of these are shown in the foreground. The close-up shows a Cincinnati planing corners of a slide bar casting for a machine tool.

Modern electric control, centralized oper-

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EASY TO USE • FIVE APPLICATIONS

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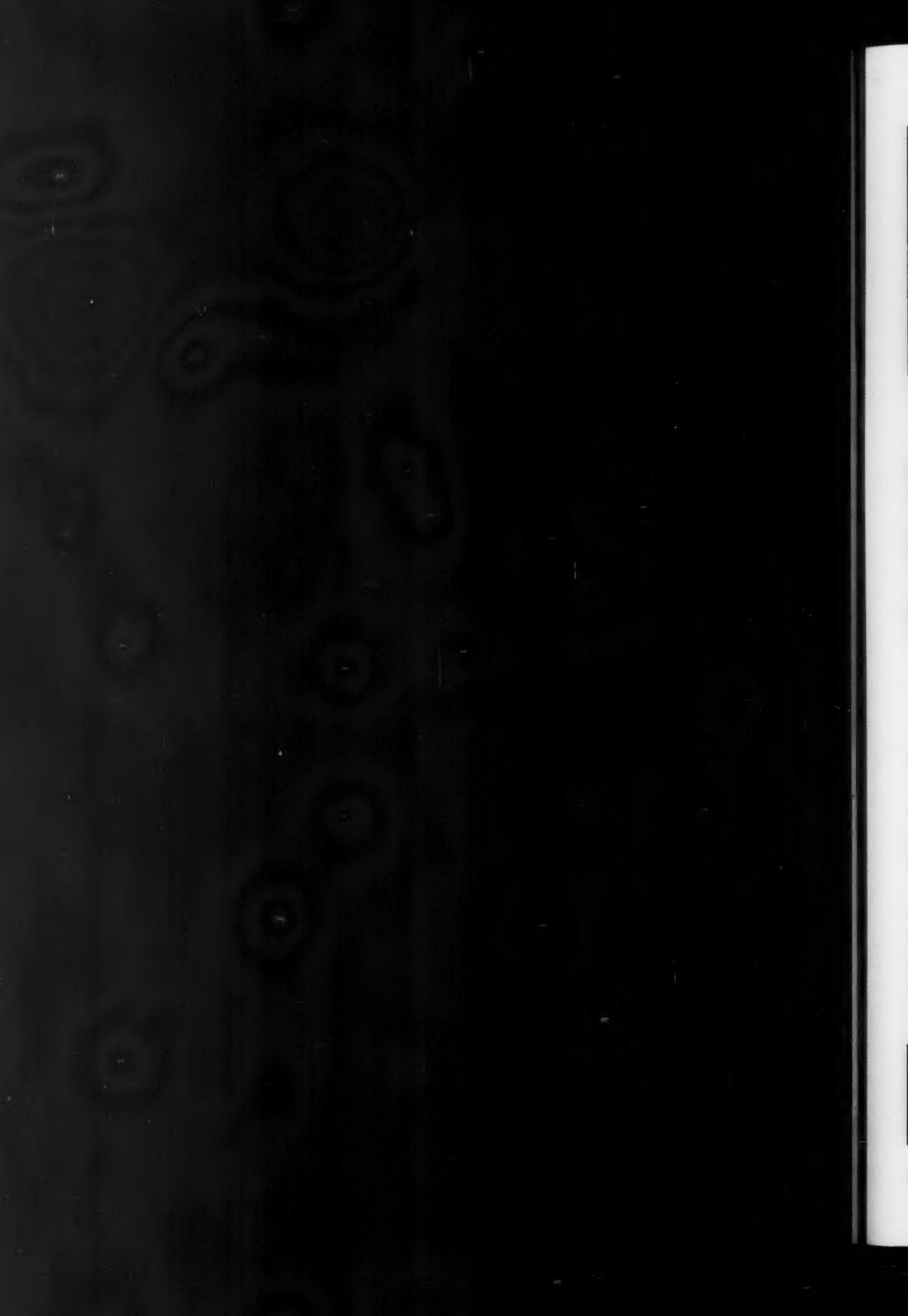
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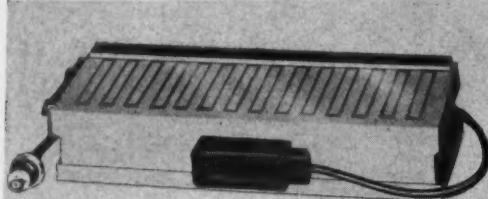
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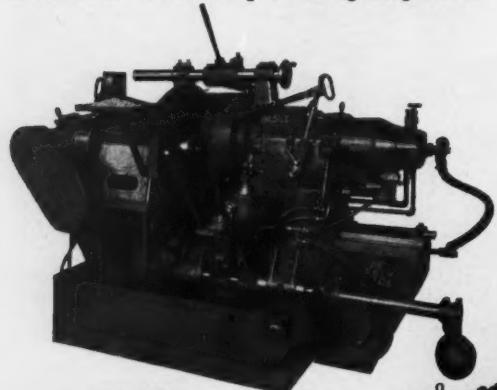


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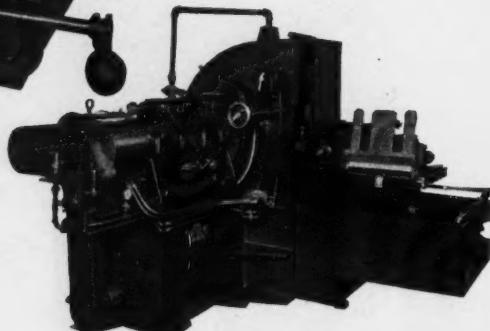
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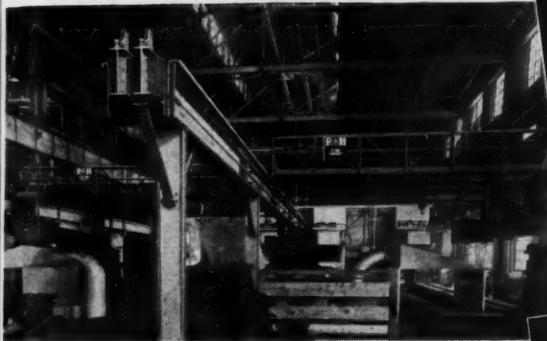


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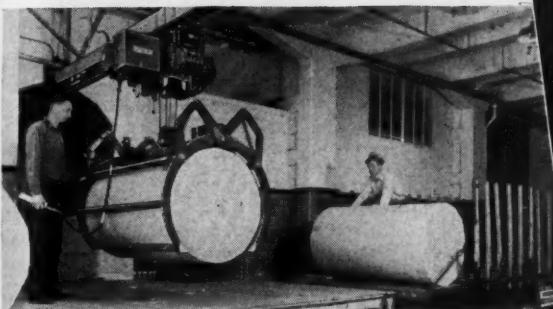


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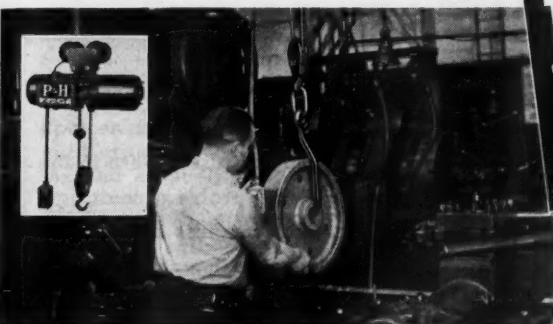


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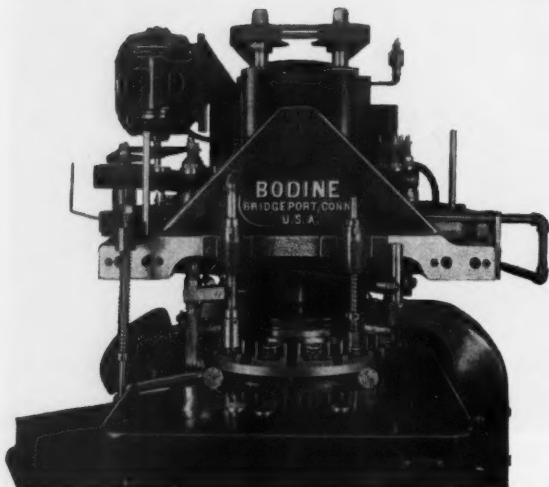
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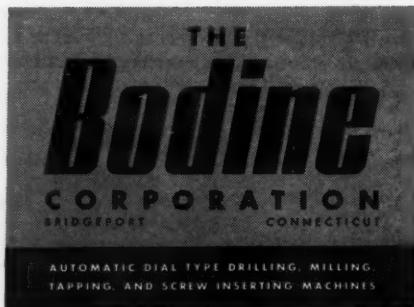
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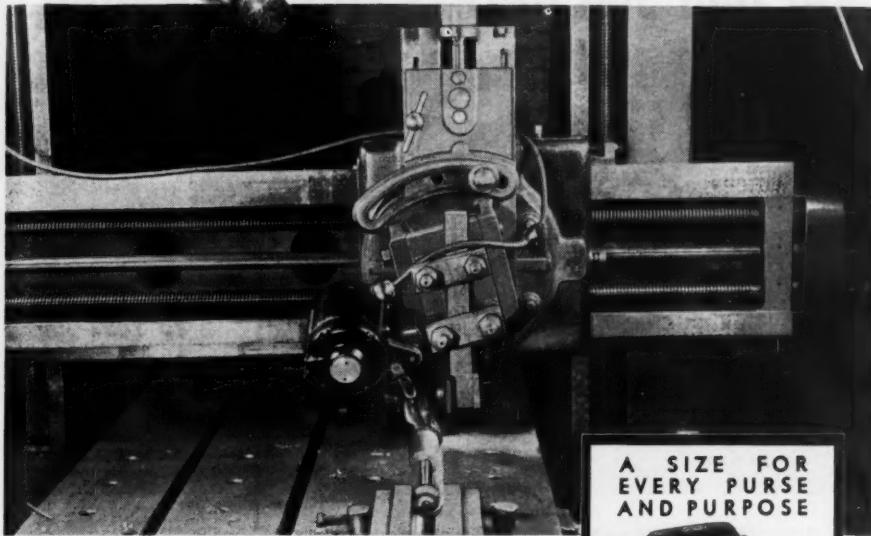
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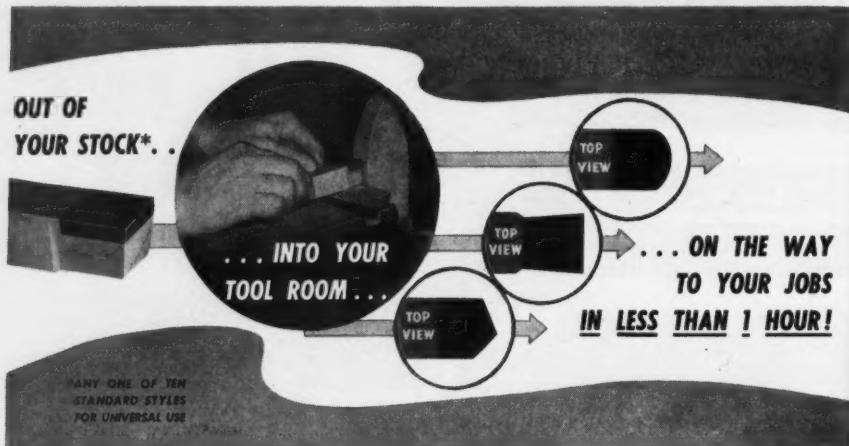
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